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# Cotton in Egypt

and the

## Anglo-Egyptian Sudan

By

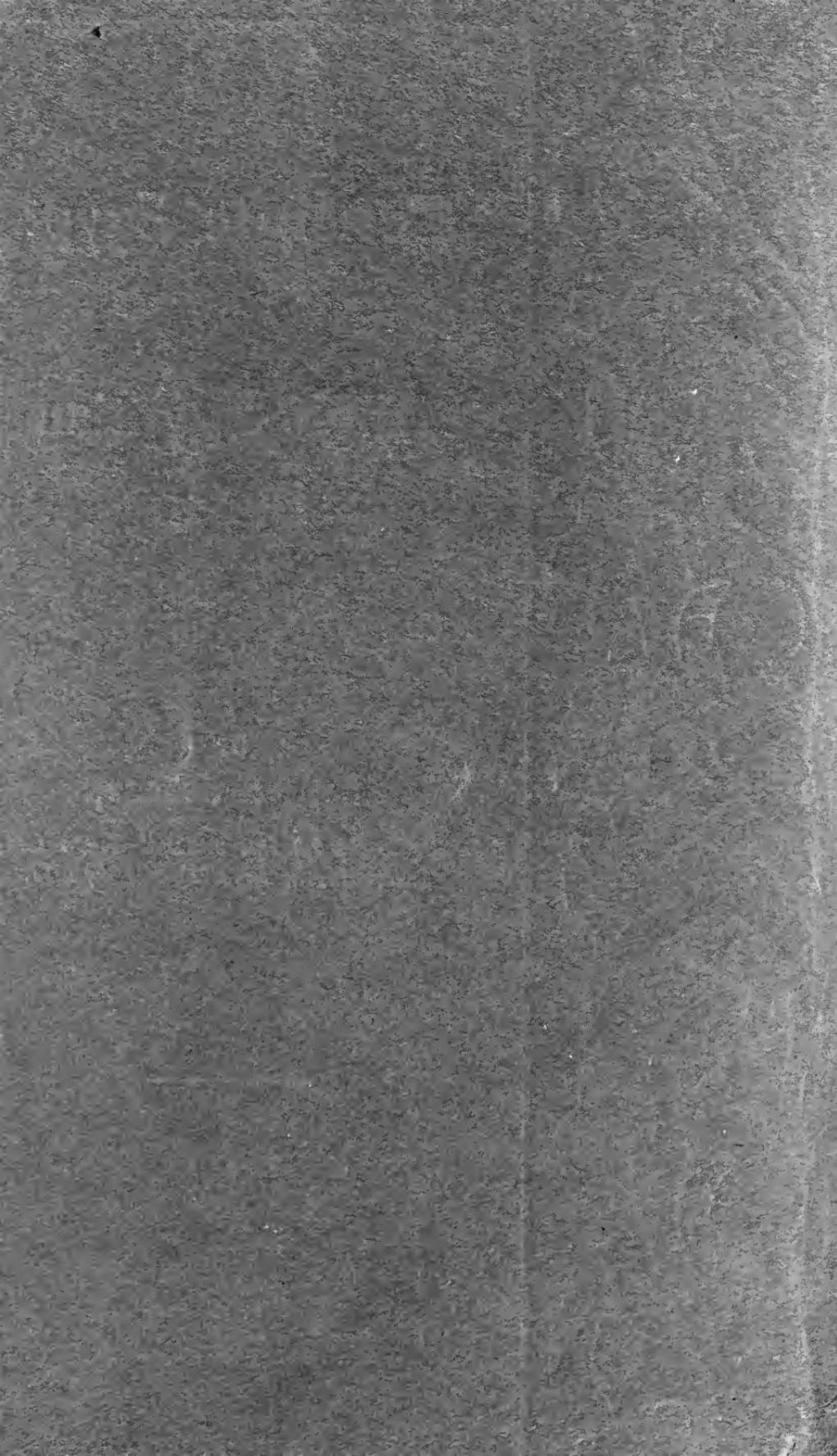
Moritz Schanz,

*Submitted to the 9th International Cotton Congress  
Scheveningen, June 9th to 11th, 1913.*

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## Moritz Schanz

1913.

London.

Submitted to the

9th International Cotton Congress, Scheveningen,  
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TO YOU  
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## **Money, Weights, and Measures.**

1 Egyptian £ (f.E.) at 100 Piastre Tarif (P.T.) at 10 Milliemes £1. 0s. 6d. ....	=	M 20·90
1 Piastre Tarif (P.T.) or large piastre at 40 Paras ....	=	" 0·21
1 Piastre Courant (P.K.) or small piastre at 20 Para Courant ....	=	" 00·10
1 Talleri, denomination derived from the old Maria Theresa dollar, to-day $\frac{1}{3}$ th of £ = 20 P.T. ....	=	" 4·15
1 English Pound (£) = 97½ P.T. ....	=	" 20·43
1 Kassaba = an Egyptian rod ....	=	3·55 Metres
1 sq. Kassaba = Egyptian sq. rod ....	=	12·6 sq. "
1 Feddan = 333½ sq. kassabas = 1·038 acres ....	=	4,200 "
1 Kirat = $\frac{1}{24}$ feddan ....	=	175 "
1 Sahm = $\frac{1}{24}$ Kirat ....	=	7·3 "
1 English acre = 0·96 Feddans....	=	4,046 "
1 big Kantar Seed cotton = 315 rrottles ....	=	141·4 kgs.
1 ordinary Kantar Lint cotton = 100 rrottles = 99·049lbs.	=	44·928 "
1 oka = $\frac{1}{3}$ Kantar ....	=	1·250 "
1 rottle = Egyptian pound ....	=	0·449 "
1 lb. = English pound ....	=	0·453 "
1 ardeb cotton seed, = 270½ rrottles, = 266 lbs. = 121 kgs.	=	197½ litres
1 kila = $\frac{1}{2}$ ardeb ....	=	16½ "
1 kadah = $\frac{1}{8}$ ardeb ....	=	2 "

## P R E F A C E .

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This book is the outcome of repeated visits to Egypt and of prolonged studies, in which I have been ably assisted by eminent experts, possessing a wide knowledge of the country and of the various questions at issue. Having been present as delegate of the German Colonial Economic Committee at the International Cotton Conferences held in Egypt during the autumn of 1912, I had an excellent opportunity of observing, in its latest phases, the development of the cotton question in the country of the Nile, as far as the Sudan, and to collect impressions, which I hope may be useful in various directions.

MORITZ SCHANZ.

*Chemnitz, Christmas, 1912.*



# EGYPT.

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## HISTORICAL.

Formerly it was thought that the cultivation, the spinning, and weaving of cotton were known to the people which built the Pyramids and the Egyptian temples, because the opinion was held that many of the mummies were wrapped in cotton cloth. It has now been proved from a minute chemical and microscopical investigation that the garments of the mummies seem to consist exclusively of linen. Nevertheless, one may suppose that cotton was cultivated and utilised in Egypt a thousand years before the birth of Christ. The Bible reports that Pharaoh presented Joseph with a cotton garment as a mark of distinction—at those times they were worn only by the nobility and priests. It is certain that cotton garments were, and remained for a long time, a rarity, and were not worn by the masses of the people. The Greek writer Herodotus, who lived about five centuries B.C., had an intimate knowledge of Egypt and of the cotton plant, but, strange to say, he does not mention its existence in Egypt, and we might conclude, therefore, that cotton did not grow in Egypt at his time. It is worthy of notice that the Egyptian pictures and sculptures show frequently the cultivation and the uses of flax, but nowhere is there any reference to cotton. The Government Department of Egyptian Antiquities has requested students of Egyptology to search for traces which might have reference to cotton, but so far their efforts have been in vain.

If Upper Egypt, Abyssinia, or the Sudan were not the home of the Egyptian cotton—and considerable doubt seems to exist on this point—there remains another explanation for the source of Egyptian cotton, viz., India. As the Egyptians were in early times keen sailors and able traders, it is practically certain that among the goods which they imported from the maritime countries along the Indian Ocean were raw cotton and cotton products; indeed, existing literature proves that Indian cotton came into Egypt before the birth of Christ. After the death of Alexander the Great, Egypt cultivated a brisk trade with India during the reign of the Ptolemies, and from this time forth there began a regular importation of cotton goods into Egypt from India, and Egypt then made attempts to grow cotton. The celebrated stone of Rosetta, which bears the key to the hieroglyphs, written in three languages, in one part refers to cotton.

The elder Pliny (A.D. 23 to 79) describes plainly how in ancient times cotton grew in Upper Egypt, towards Arabia, the products of which afforded very valued vestments, and in the year 150 A.D. Julius Pollux described the cotton plants grown in Egypt with great exactness, and related that the spun thread was made into weft yarn, for the warp linen was used. One has, however, come to the conclusion that these statements, supposed to have been made by Pliny and

Pollux, are mere marginal notes of the original made in the 14th century.

The Romans of the 2nd century found cotton garments in use all over Egypt. The wearing of cotton garments made from indigenous or foreign cotton has remained a continual custom through all the changes of time. The cultivation of cotton in Egypt has also been uninterruptedly carried on since ancient times, and has become more or less extended under the various reigns, although the historical reports may not mention the cotton-growing industry.

As in other Mediterranean countries, the appearance of the Arabs in Egypt, who were the carriers of civilisation at the time of the Middle Ages, gave a new impetus to the cultivation of cotton; at the time of Mohammed even cotton garments were quite in common use in Arabia. We find that the Arabian word for cotton, "El Kotn," is the stem of the name which the Spanish, Portuguese, Italian, French, and the English use for this new product. Raw cotton and cotton goods had already become articles of Mediterranean commerce from Egypt in the Middle Ages at the time of the Crusades. Although the cultivation and the working of Egyptian cotton had already attained a greater extension for part of the raw cotton, yarn and cloth, which was exported from Alexandria, had its origin in the Levant and India, to which countries Egypt was indebted for the best part of her requirements. In Europe cotton was looked upon as an article of luxury until far into the Middle Ages.

In several books of the 16th century it was distinctly stated that the cotton plant was rare in Egypt, and at the time served only as an ornamental shrub in the gardens. This can hardly refer to the whole of Egypt. Unfortunately, our knowledge of Egypt at this time of the Turkish Conquest is very limited. A Mohammedan writer of the 17th century describes Damanhur as the chief place of Egyptian cotton cultivation, Rosetta and Alexandria as the weaving centres, and from the commercial reports of Marseilles and other ports it is certain that raw cotton, cotton yarn, and cloth from Alexandria were regularly imported up to the end of the 18th century.

The French scholars who accompanied the Expedition of Bonaparte to Egypt gave us at last the account of the mysterious Egypt. They stated that the cotton cultivation, although carried on in a careless way, was of considerable importance, and that there existed in conjunction a very remunerative trade in cotton, and that cotton was being manufactured in Egypt. The cultivation of cotton was in existence over the whole of Upper Egypt, especially in the Province of Thebes, but generally all over the Delta. Up to 1820 we read in the French records was only grown the so-called "Belledi Cotton," a coarse, short-fibred cotton, similar to that of the Indian Surat, which was very negligently handled, and never exported in its raw state. During the beginning of the 19th century the Levant (Syria and Asia Minor) were producing a superior quality of cotton, and became the chief suppliers of cotton to the world.

Egyptian cotton cultivation underwent a sudden development under the enterprising Mohammed Ali (1805 to 1848), to whom the Egyptians owe so much, and this extension was really due to an accident.

A French engineer from Geneva, Jumel, who had travelled widely, and had visited, among other places, North America, came in 1820 to Cairo, and found in the garden of Maho Bey in Bulak several ornamental cotton shrubs, a few years old, which had an extraordinary beautiful long and fine staple of brownish tint, which attracted his attention. Probably the seed had been brought from Dongola or Senaar, where Maho Bey had once been the Governor, for south of Egypt proper, particularly towards Abyssinia, there had been grown, since olden times, a fine kind of cotton. Another account says that a Turkish Dervish brought from India a parcel of seeds as a present to Maho Bey. After Jumel had sought in vain to direct the attention of Mohammed Ali to the proper and rational cultivation of good cotton, he prepared himself a few acres near Matarieh with seed from Maho, and the three bales of cotton which he obtained from his experiment sold at such a high price on the market at Trieste that Mohammed Ali accepted Jumel's suggestion, and undertook with great enthusiasm the cultivation of cotton, in the whole of Lower Egypt, on extensive measures. In 1821, 944 kantars of this raw cotton were raised, and they fetched a price of 16 Talleri per kantar. Although the fellahs had been cultivating cotton since early times, they could not be brought to a rapid extension of cotton cultivation except by compulsory measures, which, however, were not a great burden, because the Pasha held all the lands and the monopoly of commerce for all agricultural products. It was he who ordered what should be grown every year, and at what price it should be sold. The high prices of the new Jumel cotton caused a rapid increase in the cultivation, to the detriment of wheat and the old Bellidi cotton, whose cultivation until 1832 fell continually. Shortly afterwards it was entirely forbidden, because only 8 to 10 Talleri were paid per kantar against 15 to 16 Talleri of the Jumel cotton. Before 1821 only 2 per cent. of the whole of the land cultivated was under cotton, but this percentage rose within a short time to 35 per cent., and in 1824 the surprisingly large exportation of 228,000 kantars was reached.

Very soon new kinds of cotton there had been introduced. In 1822 "Nanking" from Malta and the real "Sea Island cotton" from America had been introduced; then other species from South America, the Levant, and India were imported. These latter kinds had white lint originally, but little by little the lint became brownish. Brazilian seed came first in 1827 to Egypt, and was grown for a long time. With the exception of the genuine Sea Island cotton, which Jumel introduced in 1822 and which was cultivated up to 1838, all other kinds gave more unfavourable results than the Jumel cotton, whose demand in the market had been firmly established through the special care of cultivation which Mohammed Ali had taken. The primitive system of cotton cultivation of the past, which was of no great concern, became much improved under the joint help of experts from Syria, which country at that time was a model for the cultivation of cotton. Some experts were also sent for from the most renowned cotton plantations in North America.

Jumel, who had himself taken the lead in cultivation, saw his prophecies realised, but he did not personally make any profit, and in 1828 he died almost a bankrupt. Up to the present day the names of men who introduced modern cotton cultivation into Egypt

are remembered, for, in France, Egyptian cotton is known by the name of "Jumel"; in Germany, Switzerland, and in the other countries using Egyptian cotton by the name of "Maco." The only exceptions are the English-speaking countries, such as England and North America, where the name of "Maco" is almost unknown, and is therefore not used in commercial language.

A small portion of the Egyptian cotton crop was absorbed by the Egyptian cotton industry, which was introduced likewise by Jumel, but far the greater portion went abroad. The principal customers were Marseilles, England, Trieste, Leghorn, and Genoa. Under Mohammed Ali the profitable cotton traffic was a State monopoly, and was the chief source of income for his great military expenditure. He sold cotton to Europe at the commencement by employing alternately a small number of Alexandrian merchants, among whom all kinds of unscrupulous influences made themselves felt. In 1835 public auction sales were introduced, and the cotton sold to the highest bidder. When in 1836 to 1837, on account of the cotton crisis, the stocks began to accumulate in Alexandria considerably, the Pasha began to sell his cotton direct to Europe, and in these transactions he fixed a minimum price of 16 Talleri, but this arbitrary system came suddenly to an end. In 1838 the Pasha returned to his old practice of making private settlements with several favourites.

The cultivation of cotton during that time did not develop, because the fellah, owing to the monopoly, could not make a profit on it, and consequently he took for cotton cultivation only the poorest soil, and just enough to comply with the Government regulations. It took 10 years before the crop reached again the figures of 1824, and the rapidly falling prices, which were on an average fluctuating between 614 piasters in 1834 and 120 piasters per kantar in 1845 resulted for the fellah a still smaller profit. The quality of the Jumel cotton was considerably on the decline as early as 1840. It had been continually crossed, and a special Egyptian kind, which was quite different from the original Jumel, had come into existence. The personal interest of the fellah was never appealed to in this great economic system, and the Pasha had to limit the cultivation of cotton on those acres which he could control through his officials. In 1842 the State monopoly on agricultural products was abolished, but this did not cause any noteworthy extension, and, during the last year of the invalidated Mohammed Ali's actual reign, 1843, the cotton exports came to only 261,000 kantars, thus showing a very slight increase during 20 years, especially after the surprisingly quick development at the commencement.

Under Abbas Pasha (1848 to 1854) the fellah found time to produce certain quantities of cotton in excess of the taxed quantities, which were used for the free commerce, and were bought in the interior by agents of Greek, French and other foreign merchants in Alexandria. Cotton cultivation increased correspondingly, and in 1852 670,000 kantars, the largest Egyptian export before the American Civil War, were reached. Sixty per cent. of this went to England, which country had received its first Egyptian crop in 1824. Most of the remainder of the crop went to France and Austria.

Under Said Pasha (1854 to 1863) cotton cultivation received a new impulse, because of the payment of the taxes which had, until

then, to be paid in produce of the soil, could now be paid in cash. This enabled the fellah to choose between the crops he wished to grow, and gave him more freedom as to the sale of his products. Besides, the export duty on cotton was reduced in 1860 from 10 to 1 per cent. of the value.

The greatest stimulant to a wonderful extension was given to the Egyptian cotton cultivation by the American Civil War of 1861 to 1865, and under the influence of high war prices rose to \$52 per kantar. These prices caused a real cotton fever in Egypt. All other agricultural products were abandoned, and modern methods adapted in the cultivation of cotton. The newly-introduced Ashmouni variety proved to be suitable, and the exports in 1863 rose to 1,000,000 kantars, in 1865 to 2,000,000 kantars—a record crop, which remained for many years the highest in quantity and the best as regards quality. Egypt proved to be a successful rival to North America.

A sudden and severe fall in the price of cotton after the finish of the American Civil War caused an agricultural crisis in Egypt. The price of Egyptian cotton had fallen in 1867 to \$12½, but on account of the exceptional reputation which Egyptian had gained through her excellent quality and contrary to other countries, which during the war had raised the extent of their cotton cultivation, but had rapidly decreased it after its termination, the exports of Egyptian cotton, after a fall by nearly half the export of 1865, reached again in 1872 the figure of 2,000,000 kantars, and in 1876 it amounted to 3,000,000 kantars, and this remained more or less the annual crop until 1890.

The quality of the old Jumel cotton had deteriorated so much since the middle of the sixties that the European spinners repeatedly raised earnest complaints. In the cultivation and raising of new kinds, such as Ashmouni, then Mitafifi, the Egyptians were very fortunate; particularly in the nineties the latter gave excellent results. The size of the crops showed now a rapid increase. In 1890 4,000,000 kantars were raised; only two years later we find an increase of another 1,000,000 kantars, bringing the crop to 5,000,000 kantars; in 1897 it reached 6,500,000 kantars. It is true the price fell in 1894 to 7 Talleri, and already at the beginning of the nineties complaints as to the falling off in quality and the ginning outturn were renewed.

From 1898 to 1909 a period followed in which, in spite of an increased area, the relative yield constantly fell. This falling off in the relative yield came to about 40 per cent., and in 1909 the absolute yield had also come down to 5,000,000 kantars. This, in spite of the introduction in the early years of this century of the new and better species of Jannovitch, Nubari, and Sakellaridis, which were little by little taken up and cultivated freely. It is true the prices rose quite considerably on account of the scanty crop in 1909. May contracts of 1910 rose to \$31½. The year of 1910 brought a crop of 7,500,000 kantars—the record so far, and therefore lower prices.

The commercial cotton of the world is made up by the United States of America (60 per cent.), India (18 per cent.), and Egypt (8 per cent.), in 1910, consequently the latter country, even if it is

no more known as the “corn bin” of the world, is the third greatest producer of raw material, supplying one of the most important industries of the world with one of the best kinds of cotton. Egypt is almost the sole producer in the world of the finest kinds of cotton, and the world looks to Egypt for this supply. For Egypt herself the question of cotton growing is of vital importance. In the districts where cotton will grow at all, the cotton area usually takes up on an average one-third or one-half of the whole arable land, and provides the farmer with the most important ready-money crop, whose worth in one year reaches from £25,000,000 to £30,000,000. Cotton and cotton seed form 90 per cent. of all the exports of Egypt. Certainly this extension of cotton cultivation is partly at the cost of other cultivations, so that Egypt, an agricultural land *par excellence*, must go to foreign countries for the supply of her foodstuffs.

We will now first consider shortly the chief foundations of Egyptian agriculture generally.

#### THE CULTIVATED LAND AND ITS POPULATION.

When we speak of the agricultural worth of Egypt, we must remember that the country, which on the map may seem large (it has 994,300 square kilometres, or nearly double the area of the German Empire), is in reality a huge desert, covered with rock and sand, that the rainfall is not worth speaking of, and that consequently the land depends entirely upon the possibilities of irrigation. The Nile has been from times immemorial the real vein of life; without its regular floods, which inundate the arable land and at the same time water and manure it, the whole of Egypt would only be a vast desert. The Nile Valley is forming in the most barren part of the desert a small arable strip of land, which might form a convenient approach to the interior of Africa, if the river were not in places confined, in its middle course, by narrow walls of rocks, causing even the green banks to disappear partially, the Nile to run over obstacles in cataracts and rapids. In earlier times that part of Egypt which is inhabited up to the first cataract formed a long gulf, beginning at the Mediterranean Sea, in the shape of a shallow funnel, which has gradually been filled up by silt from the Nile. These deposits have been made in such a manner that the Nile has built through its deposits of silt in the middle of the Delta a dam, on which it has made its channel. The plains of the valley, which run parallel with the course of the Nile, are at a deeper level than the river, and thus allow a convenient method of irrigation at flood time.

This arable strip of land is in the lower Nile Valley, south of Cairo, no more than 30 kilometres wide, and in Upper Egypt seldom more than 7 kilometres. The total arable land extends in length only to 900 kilometres from Cairo to Assuan, and forms a cultivable area of 12,660 square kilometres. This part of Upper Egypt is called “Said,” which means upper land. Only a single valley extends to the west to the district of Fayoum, which is supplied with water by the Joseph’s Canal. In olden times this part was highly cultivated, and it is again being revived. This valley contains 1,380 square kilometres of arable land. Twenty-two kilometres below Cairo the Delta or Lower Egypt commences; in the Egyptian language it

is called "el Bahri," that means the "land of the sea," and is really a present given by the Nile. It stands only a few feet above sea level, and where it is not covered with salt lakes and swamps forms one of the most fertile corn lands upon the face of the globe. The soil is quite free from stone. It has a coastline of 270 kilometres, and the greatest length from north to south is 171 kilometres. Its cultivated area at present amounts to 20,600 square kilometres.

The fall of the Nile is small, and from Assuan to Cairo amounts to only 92 metres; from there to the sea it is only 10 metres.

The entire culturable area is stated as follows:—

	In thousands of feddans.		
	Lower Egypt.	Upper Egypt.	Total.
1881 .....	2,610 .....	2,104 .....	4,714
1890 .....	2,762 .....	2,179 .....	4,941
1900 .....	3,218 .....	2,266 .....	5,484
1905 .....	3,305 .....	2,286 .....	5,591
1911 .....	3,403 .....	2,253 .....	5,656

It follows from this tabulation that the whole area of culturable land since the opening of the Assuan Dam has increased very little, whereas the area available for summer irrigation has been substantially increased, and both in the Delta and in the Nile Valley proper the producing power will be considerably greater through the extension of irrigation on the lands which up to now had not been irrigated.

It was estimated in the year 1911 that 32,270 square kilometres of arable land were outside the desert; in other words, only about one-thirtieth part of the whole area of Egypt. Thanks to the great fertility, this little strip of land has always been one of the most populous tracts in the whole world. The population stands to-day at  $11\frac{1}{2}$  millions, against  $9\frac{3}{4}$  millions in 1897, and  $6\frac{5}{6}$  millions in 1882, only eclipsed in comparative density by Bengal; it is 20 per cent. more densely populated than Saxony. In Saxony we have a population of 301 to the square kilometre, while Egypt has a population of 362 to the square kilometre. A soil which gives several crops per year can maintain by its own resources a greater number of people.

Among the mixtures of people who inhabit Egypt to-day, the Mohammedan fellahen, which means the "ploughers" or "peasants," are the most important; in spite of their frequent mixing with immigrants, conquerors, and slaves, they still show the old Egyptian type. They are, generally speaking, a very hard-working class of people, and their race is still very strong. They have remained without any wants, and are very frugal. They still build their house of dried Nile silt, cover them with a few mats made of straw, reeds, or cotton stalks; there is hardly any furniture in their huts, and their clothing is very simple. Elementary education requires to be extended very much, as the census of 1904 showed that 94 per cent. did not know the alphabet. On the other hand, in consequence of these lamentable educational conditions, juvenile workers in Egypt are plentiful. As the children do not go to schools, they find readily work in the fields and factories. The limit of age for work in the latter is 13 years; a special law regulates the employment of children in ginning factories.

According to the census of 1907, Cairo had 654,000 inhabitants and Alexandria 332,000; there were 43 smaller towns with over 10,000 inhabitants and 3,581 villages. Those who know Egypt from formerly and have been absent for some time will be astonished when re-visiting the country again at the change which has come about in the last 20 years. Not only have Cairo and Alexandria been magnificently extended through new suburbs, but also the provincial towns have agreeable new parts, with houses built after the European style, electric street lighting, town's water, telephone, watering of the roads, and beautiful public parks, and even the poor villages of the fellahs are beginning to make a more pleasant impression. Lord Kitchener is trying to show the fellah by the building of model houses on the States Domains that a proper dwelling is much more pleasant and healthy to live in than the old clay or mud huts, and that in the long run they are cheaper. He also hopes in this way to fight the enormously large infantile mortality. The improvement of the fellah forms one of the chief items in Lord Kitchener's programme.

#### AGRICULTURAL LAND.

The agricultural land is formed by an old sea bed, covered over first with sand from the sea, then with a layer of mud from the lagoons, and, after the rising of the ground, with Nile silt. Thus the whole of the agricultural land found in Egypt has been covered with fertile Nile silt, almost uniform in character, even in places of different height, and very remarkable is the fact that these fine soils allow the water to percolate very easily.

The culturable soil in Egypt is Nile silt, consisting largely of clay and silica (sand). It has been used for ages in the making of bricks. Under the influence of the sun and dryness, large rents are caused in this clayish soil, and therefore the air is able to penetrate into it. In other countries this result can only be arrived at by careful ploughing. The finely-grained Nile silt contains nourishing food for the plants in an easily extracted form. With regard to the chemical constitution of the soil, it is rich in potash or phosphoric acid. It contains a considerable amount of chalk, usually not less than 3 per cent. to 4 per cent. (sometimes as much as 8 per cent. to 9 per cent.), magnesia from 2 per cent. to 3 per cent.; nitrogen is only found in small quantities. This black, sticky clay soil is sometimes 6 to 12 metres deep, and produces good and many cotton crops, but it is heavy to work and becomes easily sour through stagnant water.

In other districts the clayish layer is only a few feet deep, and has underneath it a porous earth, sandy clay, and very fine sandy soils are also represented. Vegetation on this light soil is satisfactory, but the yield and the quality of the cotton are smaller. In fact, the fertility of the soil is by no means so great *on an average* as is generally thought, and even in the Delta one finds in the best agricultural districts here and there sandy desert plains.

It is worth noting that the Egyptian cotton plantations are partly rich in common salt. Even in well-established cotton plantations, at a depth of half a metre there are found 0·6 per cent. of easily soluble salt, and sometimes as much as 2 per cent. It seems that a small

percentage, say  $\frac{1}{2}$  per cent. of salt, is favourable to the fibre. When the percentage of salt is higher the plant remains small, and the fibre becomes weakened and stunted. The whole of the salty land which contains more than 15 per cent. is called "Bararis."

Sandy desert land is only made into permanently fertile arable land through an ample supply of water, and where salt has to be washed out of the soil, it is done by ploughing it, then flooding the field with fresh water during four or five days, after which the salt water is taken away by other canals. This washing out of the soil must be made very frequently, and must be continued so long until the water which flows from the field only contains a small percentage of salt. At the beginning of the washing operation the water shows so much as 15 per cent. of salt, and it is only after several weeks of washing that this percentage comes down to  $\frac{1}{2}$  per cent. or 3 per cent. The cost of washing is about £10 per feddan.

Generally, it is thought that land at 23 feet above the sea is free from any injurious quantities of salt; in lower places, with insufficient drainage, salt makes its appearance, and land which is 10 feet above the sea level always contains large quantities of salt, and very careful drainage and washing is required; land which is not higher than 5 feet over sea level is unfertile. In Upper Egypt are also salty soils. For example, at Kom Ombo; the salinity of the soil therefore does not always depend on the height of the land.

#### THE CLIMATE.

The southern districts of Egypt have only one season, consisting of a hot and rainless summer, with an almost even temperature throughout the whole year; the middle and northern districts, however, have a cool and a hot season. The cool season lasts from December to March, and is similar to the spring and the autumn of the more temperate countries of Europe. The predominant north winds alleviate the heat of the day and are of very great use to the river boats, but on the other hand they are at times very injurious to the young cotton plants. As in the United States of America, cotton cultivation is carried on in Egypt in the early part of the year; shortly after sowing a pretty sudden rise in the temperature is noticeable, and the maximum is reached in July. February shows with it the mean temperature of  $12\frac{3}{4}^{\circ}$  C. the minimum, and the average yearly temperature in the Nile Valley reaches  $30^{\circ}$  C. The absolute minimum temperature is a little higher in Egypt than in the Southern States of America. In the Delta the temperature varies from between  $2^{\circ}$  C. and  $35^{\circ}$  C., and already in Cairo between  $2\frac{1}{2}^{\circ}$  C. and  $43^{\circ}$  C. The average temperature of the year is  $21^{\circ}$  C. in Alexandria and Cairo. On the coast the temperature seldom rises above  $35^{\circ}$  C.; in Cairo it reaches  $42^{\circ}$  C., in Assuan  $45^{\circ}$  C., and when the Khamseen is blowing it even reaches  $45^{\circ}$  C. in Cairo. In the Nile Valley the temperature seldom drops below freezing point, but Cairo has every winter  $1^{\circ}$  C. and  $2^{\circ}$  C. below zero, and in the desert it gets even colder.

Snow falls quite exceptionally in the Delta, sometimes even a thin crust of ice forms on the edge of the Nile in Upper Egypt, and the frequent dews, which freshen the summer vegetation, change, in the winter months, to an injurious hoar-frost. Egypt, however, does

not know what real frosts are. Whilst in the Southern States of America the frosts in spring or autumn frequently destroy, or at least injure vegetation, this danger does not exist in Egypt. In this country plants are threatened by the desert wind, called "Khamseen," which blows from March to May, and causes the leaves to fall off.

As regards the rainfall, it may be stated that it rains frequently on the north coast from October to March and April, in the remaining months hardly ever; the whole of the rainfall is, however, only 200 mm. to 350 mm. In Upper Egypt it rains very seldom. In the Delta it rains mostly in December, January, and February, also in November and March, little in October and April, and not at all from May to September; it is looked upon as a very rare exception when it rains for 5 or 10 minutes in August or September; June and July are quite free from rain. Alexandria has a yearly average rainfall of 209 mm., but Cairo is satisfied with 35 mm. Thunderstorms are also very seldom, and as at the time of flowering and ripening it does not rain in the whole of Egypt, injury to flowering and ripening cotton by sudden downpours of rain is totally unknown. With such a small rainfall it would be impossible to cultivate cotton unless by some means of artificial watering. Where there is an abundant supply of irrigation water it is easy to regulate the water supply in such a manner as to correspond to the necessities of the cotton plant. Egypt is in this respect much better off than many other countries with uncertain rainfall, as, for example, East Africa.

In Egypt there are only the morning fogs to fear in the autumn, which start as early as the end of July; they last up to 9 and 10 o'clock in the morning, and when they are accompanied by great heat they cause the buds and bolls to fall off prematurely, or at all events they delay the ripening. These fogs chiefly appear in the intermediate months between rainy and dry weather, when the temperature does not get cool enough to cause rains. This period of fogs extends from the end of August to the middle of October, and then again from March to April, but during the latter months they are not severe; one hardly ever hears complaints of these spring fogs as they do not cause much harm. The autumn fogs, too, are not very injurious if they do not last too long in the day, and provided the sun has not already too great a power when the fogs clear away, say from 7 to 8 o'clock in the morning. If the fogs last up to 9 or 10 o'clock, when the sun is already very hot, then the drops of dew which remain on the bolls burn the latter in consequence of the great heat of the sun. Recently certain local fogs are attributed to over-watering.

Excessive falls of dew during the picking period are also injurious. In Egypt there are dews nearly right through the year, chiefly in autumn and winter, and, as already mentioned, the north wind causes at times hoar-frost, and even thin ice.

Otherwise the humidity of the air is relatively small in Egypt, although it varies in different places. In the Nile Valley itself the humidity, being caused by the evaporation of the Nile water and the water from the irrigation system, is greater than in the adjoining desert tracts, although the maximum in November and December shows only 52 per cent., and the minimum in May 24 per cent. of

saturation. In Alexandria the humidity of the air is mostly 70 per cent. and 80 per cent., and the maximum 97 per cent., and for example, only one day in 1911, in April, had 35 per cent., one day in January 40 per cent., and in the whole of the year only 35 days had less than 60 per cent. In the south of Egypt the atmosphere is remarkably dry, and on account of this dryness cotton in Upper Egypt is, no doubt, unfavourably affected. Assuan shows on an average throughout the year only 35 per cent.

A consequence of the small rainfall and of the clearness of the sky during the day is that in Egypt the cotton plants are exposed to a great amount of sun, which is very favourable to their growth in the early stages, but in Upper Egypt the plants seem to suffer somewhat from too much light.

The fluctuation of the air-pressure is trifling.

#### IRRIGATION AND LAND RECLAMATION.

As has already been said, agriculture in Egypt depends upon irrigation, entirely independent from the limited atmosphere precipitation of rain, and this system has made it possible to grow in a desert climate valuable agricultural products, belonging to the warm and cool regions, side by side. Only on the north coast between Alexandria and Tripoli is the rainfall sufficient for the Bedouins to produce a barley crop.

Thousands of years ago Egyptian agriculture was already assisted through the yearly floods, which enabled the arable soil by means of the red silt deposits that the Nile brought down during the flood-time to grow produce. The distribution of the precious water was made through a complicated system of artificially constructed basins and channels. Reclamation of desert land through regular watering and cultivation of resisting plants was also undertaken in those times, just as at present, although modern science has latterly brought many improvements about in the carrying out of this work.

The yearly floods of the Nile are an important factor to everyone in Egypt; these are brought about by the tropical rains in the district of the great Central African Lakes and of the Abyssinian Highlands. The floods commence at Assuan at the end of June, in Cairo at the beginning of July, and after a rapid rise they reach their highest point in October. The subsequent decrease is very slow, the river only reaches its lowest level again in April, May, or in the first days of June. From Roseires on the Blue Nile near to the Abyssinian frontier, the flood usually takes seven weeks before it reaches Cairo, namely, from Roseires to Khartoum 14 days, to Assuan 22 days, and from there to Cairo 12 days. The daily speed of the Nile current, when it is at low level, is 67 km., but at flood times it reaches twice that speed. The Nileometer shows on an average of many years the lowest watermark to be at the beginning of June, the highest at the beginning of September. The difference between the highest and the lowest level is 15 metres at Assuan,  $8\frac{1}{2}$  at Thebes, and  $7\frac{1}{2}$  at Cairo. Before the construction of the large dam assured a water supply, drought and famine were the result when the flood had been at any time only 1 metre less than the normal 8 metres, whilst the additional rising of 50 cm. above the

usual height have caused the devastation of the fruitful lands. In this way the Nileometer is the national clock for the well-being of Egypt, and its movements are even to-day watched with anxiety just as in the olden days, although owing to the extensive canal system such damage is to-day impossible.

In order to prevent that the high waters of the Nile pour their fruitful contents too fast into the sea, the whole of the culturable land has been divided since ancient times into large basins (*Hôds*) by means of dams which, during the flood-time, serve as a line of communication. These basins, holding 500 to 48,000 hectares, are formed by a dam running parallel to the main stream, which prevents the direct flooding of the latter, and by two dams at right angles to the first dam, with an inlet and an outlet canal which have sluices built partly of brick. At the time of the flood these basins, which run from north to south, step-like, falling from north to south, are filled under the superintendence of special engineers, and the valuable water is held for a certain time—usually from six to seven weeks—in one of these basins until the proper amount of silt has been deposited, *i.e.*, a deposit of about 15,000lbs. of solid substance per feddan. The water either flows then straight into the Nile or it is taken to a lower-lying field, although it has by then become impoverished. The water supply thus accumulated had to suffice for the cultivation.

Up to the year 1837 this basin irrigation by flooding was the only way of irrigating independently from the direct flood of the Nile. As cotton cultivation is carried on in summer, and cannot be undertaken in the fields watered by means of this basin irrigation, *Mohammed Ali* introduced an irrigation system into the Delta, in which the basins were replaced by a network of canals which were filled at the time of the flood of the Nile, and through this system the water was held back in the main canals, whilst the tributary canals were only periodically filled with water; special drainage canals carried the water off into the sea which was no longer required. The building of the first bridge-dam or weir in the Delta was also undertaken by *Mohammed Ali*, and carried out with the aid of French engineers, although not in a satisfactory manner.

After these great improvements there came a long lull, and it was only after the occupation of Egypt by the English that with the practice gained in India the working-out on a larger scale of the irrigation system was begun. In order to make cultivation less dependent upon the different heights of the Nile floods, it was then decided to store up the ample water supply of the Nile and to use it for cultivation, chiefly for cotton, by means of so-called “perennial canals,” from which at any time of the year water could be had in any desired quantities.

As the masterpiece of the great weirs that have been constructed by the English must be considered the Assuan Dam, that has been built between 1898 and 1902, according to the plans of the engineers Scott-Moncrieff, Garstin, & Willcocks; it is nearly 2 kilometres long, and its basins hold the water back during November, December, and January, to be used for cultivation in summer, *i.e.*, up to the beginning of July. As long as the flood-water of the Nile is very muddy all the 180 sluice gates of the dam are kept open; in October and

November the water becomes clearer and the sluice gates are gradually closed; the reservoir is filled in about 100 days. When there is a lack of water in Egypt, about the beginning of April, the quantity required is let off until the beginning of the new flood, *i.e.*, at the beginning of July, when all the sluices are opened again. So far this reservoir was able to hold 1,000 million cubic metres of water, and this was used specially for Central Egypt, the Fayoum, and the pumping stations south of Cairo. In 1907 work was started to heighten the dam by 7 metres, which work was completed in 1912, and the reservoir is now able to hold 2,300 million cubic metres, from which additional 950,000 feddans of Delta land will be watered; these had up to now, owing to lack of water, not yielded enough or were lying entirely fallow. The dam will also substantially extend the cultivable land in Central Egypt, whilst Upper Egypt, which possesses a complete system of basin irrigation, is to remain in its present condition until some works of regulation in the sudd districts of the Upper Nile can be undertaken.

The remaining irrigation works, which are situated in the Egyptian Nile Delta below Assuan, are at Esneh, Assiut (for regulation of the irrigation of Fayoum), on the Delta point, and near Zifta; they all aim at the artificial damming of the flood-waters for the filling of the main canals in order to save pumping. A dam on the Rosetta arm is in projection. All the works serve the purpose of keeping the water at the proper level in proportion to the surface of the cultivated land, and to raise the level of the Nile so that the water can flow easily into the lateral tributary canals, which begin below Luxor. The water level in the canals is already a few miles below the branching-off point higher than the level of the bordering land, so that the water can easily flow on to the fields by means of sluices and small ditches. Willcocks' great project to make a giant reservoir in the *Wadi-Rayan*, in the district of the Lybian Desert, south of Fayoum, which would hold no less than 20 milliards cubic metres of water, finds still many opponents in Egypt.

The "perennial" canals or permanent canal system has been carried out since 1910 in the whole of the Middle Egypt, Lower Egypt, and the Fayoum, as far as the surface of the land will allow; it has gradually displaced the old system of basin irrigation along the Nile as far as Upper Egypt, and the latter system is now used only in Upper Egypt, which is difficult to irrigate. Land which formerly depended entirely upon the flood of the Nile enjoys to-day a regular summer irrigation, and in this way cotton cultivation in Central and Upper Egypt has advanced from 53,000 feddans in 1894 to 246,000 in 1906, and 363,000 feddans in 1911. With basin irrigation alone, the cultivation of cotton and sugar would have been impossible there, because the methods of watering could, on account of the period of vegetation, only be used upon land growing cereals and vegetables. The basin irrigation has, it is true, the advantage of bringing the Nile silt on the land, which with the perennial canal is mostly deposited in the canals. For this reason the soil of Upper Egypt on the whole is not so much exhausted as that of Lower Egypt. Where canal irrigation exists one must reckon the acreage as at least double in order to obtain a true comparison of the culturable area, because at least two crops per year can be grown. No

irrigation in Egypt means desert, flood-irrigation gives one crop in the year, but canal irrigation gives two or three crops on the same soil.

Egypt is now divided into five irrigation districts, with an English engineer at the head of each; the irrigation service is capitally organised, and renders to agriculture invaluable benefits, for the prosperity of the land depends upon the proper distribution of the waters of the Nile. In every province there is an agricultural "council," which does not really see to the cultivation, but to the judicious distribution of the water, to the opening and shutting of the collecting basins, and keeps in touch with and advises the irrigation engineers.

In the months from September to April the water in the Nile is plentiful; towards the beginning of May the water level becomes too low in the Nile to feed the enormous network of canals, and from then, *i.e.*, from May to August, the water stored up in the reservoirs is used; it is given out in so-called "rotations," the duration of which changes according to circumstances; in unfavourable cases the fields receive 6 days water and none during 18 days.

During flood-time in Upper Egypt the Nile seems like a long lake, out of which the villages rise like islands, but on account of the regular canalisation existing in the Delta, the landscape there hardly changes through the flood. As in Upper Egypt, too, the flood-water is being taken more and more into canals, the well-known picture of the "flooded Nileland" will gradually disappear.

The whole of the arable land of Egypt, the extension of which is limited by the possibility of irrigation by the water of the Nile, and must therefore always remain relatively a narrow strip of land, is divided into two large classes as regards the level of the water from the earth's surface, viz., the land flooded by the Nile, called "Raye," and the higher lying "Sharaki" land, which can only be watered by artificial irrigation.

In order to bring the water to these high lands, which are at times in three, four, or more terraces, and where the flood cannot get, the people have to use several artificial means for raising the water, by human power, or animals, driving winches, and, latterly, by power machines.

The most primitive appliance is the "Nataleh," it is a swinging basket, made out of date palm leaves; it is fastened to four sticks, and whilst the basket is swung it lifts the water  $\frac{1}{2}$  to 1 metre high. This contrivance is little used. Another simple device for raising water is the "Warbur," an open wooden trough,  $2\frac{1}{2}$  by 3 metres long; it is fastened to the bank by a rope and is dropped into the canal and raised up by one man; it lifts from  $\frac{1}{2}$  metre level. More elaborate, but easily worked, is the "Tambur," the Archimedean water-screw, which is made of wood or iron, and is used very frequently in the Delta by small peasants; it has the advantage of being easily carried about from place to place. Very ancient is the "Shâdûf," which is worked by one person; it is a scaffold structure, similar to a toll-bar, with a leather bucket, in which the water is raised to a height of 3 metres. Still more easily worked is the "Sâkije," or the "Noria," an appliance like a winch, lately much improved, driven by oxen or camels; on its scoop wheel are fixed earthenware pots; it raises the water from 3 to 8 metres. Still more

effective is the "Tâbût," a kind of hollow wheel, which is driven by cattle, and is met with all over the Delta; it is best suited for a lift of from 1 to 2 metres. The water from all these lifting apparatus flows in furrows on to the field, and a cut through the ridge is sufficient to let the water flow on to the lower-lying cultivated area.

It is reckoned that one "Sâkije" is sufficient for 10, and one "Shâdûf" for 5 feddans.

Lately, modern hydraulic and steam pumps are being used more and more; the first steam pumps of an inferior quality were introduced from England, as far back as 1862. To-day these plants, improved in many ways, may be counted by thousands, and they have displaced altogether the old method of raising water on all large estates. These pumping plants are driven by stationary steam engines, locomotives, and some by electricity; they are largely supplied by Rushton, Proctor, & Co., of Lincoln, by Clarens, Ltd., of London, and by W. H. Allen, Son, & Co., of Bedford; next to these come latterly those of Gebrüder Sulzer, of Winterthur (Switzerland), die Vereinigten Maschinenfabriken, Augsburg-Nürnberg (Germany), Otto, Deutz, and other German firms. The collecting of solar rays, an American patent, has also been tried at Heluan for the purpose of pumping water. Most of the pumping stations are worked by ordinary locomotives, connected with a centrifugal pump which lifts the water, and some owners of pumps are supplying against payment water with these machines for the neighbouring fields of the fellahs. The construction and extension of the canals have not made the use of the many different water-lifting contrivances obsolete, for it must be borne in mind that the level of the stream is not everywhere high enough to give a free flow irrigation to the fields. Water from private pumps or private canals is sold to the fellahs at about £E1 to £E1½ per feddan when the river is at its lowest level.

The chief items of the German agricultural machines in Egypt are locomotives, Diesel motors, and centrifugal pumps for watering purposes; the latter are well liked, in spite of their high prices, as they require little coal for the amount of water which they raise. Pumps of a low class are manufactured in the country. German gas and petrol motors find an increasing sale on account of their good quality, and in these, as well as in all kinds of agricultural machines, the sale might be considerably increased.

The agricultural exhibition at Cairo in 1912 included, amongst other exhibits, a very powerful pump of A. Borsig, Berlin, which was connected with a gas engine of the well-known firm of "Otto," in Deutz (Cologne), whilst excellent locomotives of the firm of R. Wolf, of Magdeburg, were driving centrifugal pumps of Klein, Schanzlin, & Becker, of Frankenthal. G. Meinder & Co., of Frankfurt, had also motors exhibited.

The most important pumping stations are situated in Central Egypt, in the eastern province of Giseh, where 45,000 feddans of old basin land are being irrigated since 1909 by two large pumping stations belonging to the Government; this land is now watered throughout the year.

Before that time private initiative had already given attention to irrigation by working pumping stations on a commercial basis; the oldest of these companies is the Société Egyptienne d'Irrigation,

founded in 1896 at Cairo, with a capital of £80,000 ordinary shares and £40,000 debentures. This company lifts the water of the Nile at Naghamdi by means of two pumps, made by Sulzer, from a level of 8½ metres, and supplies the water for sugar cane cultivation against a payment of £3, provided the cane is supplied to the allied company, the Société Generale des Sucreries et de la Raffinerie d'Egypte, otherwise the charge is £E3½. The company pays 8 per cent. dividend, and its £20 shares are quoted at £30.

On a much broader and more important basis is the enterprise of Sir Ernest Cassel in London, who in combination with Cairo financiers, such as Suares and Pelizäus, founded in 1904 a company owning a considerable area of land; it has a capital of £1,000,000 sterling; this company is called Société Anonyme du Ouadi de Kom Ombo. Thirty thousand feddans of desert land were bought at 20 piastres at Kom Ombo, in Upper Egypt, which, although at a somewhat high altitude from the Nile, had the advantage of being easily levelled. The company has the right of purchasing further 90,000 feddans of land; at present 22,000 feddans are under most flourishing cultivation by means of artificial irrigation. An installation by Sulzer, said to be the largest pumping station in the world, lifts with three powerful suction pipes of a diameter of 2 metres the water from the Nile, supplying at times of high flood and with a 15 metres lift, 12 cubic metres; at low Nile it will lift from a 24 feet level 9 cubic metres per second. A network of canals takes the water over the whole land. One thousand cubic metres of water cost 18 to 20 piastres, each watering per feddan requires 500 cubic metres, and costs, therefore, 9 to 10 piastres. Wheat and barley require 10, cotton 20, and sugar cane 30 waterings, the conditions of the wind and the soil at Kom-Ombo being less favourable than at Luxor, where sugar cane only requires 18 to 20 waterings. In the former desert of Kom-Ombo are now 30 villages, containing about 14,000 inhabitants, mostly from Central Egypt, of whom 5,000 are men. The villages are situated amongst most luxurious vegetation of barley, wheat, and durra, and sugar cane. Originally the management intended to grow principally cotton, but it was found necessary to limit cotton to experimental farms, owing to the soil being very salty in places, and owing to its composition and little retentive power. The results obtained were not satisfactory, which may partly be attributed to the lack of expert management. This modern agricultural company has so far not been able to pay any dividend in consequence of its enormous capital outlay, but since 1911, after the Société des Sucreries had in 1910 erected at Kom-Ombo a large sugar refinery, which handles the cane grown on the land, the company has been able to pay its expenses. What the commercial result of this enormous undertaking will be cannot yet be anticipated with certainty, but in any case this new method of cultivating desert land might justly become the example for the whole of Upper Egypt and the Sudan, and open up unexpected prospects.

Finally, we must consider under the heading of irrigation another kind of plant. In those places where Government canals and water-lifting appliances, which take the water from the canals or direct from the Nile, are not sufficient, we find latterly more and more tube-wells, driven by pumps. The old Egyptians already knew

how to bore wells, and the desert of Thebes, for instance, may be said to be covered by them. The subterranean water which enters into consideration is of a two-fold nature. It is found firstly in the sand and gravel layer, and being connected with the river, its level rises and falls with the latter; the second kind is near the surface, and is the water that has penetrated from the surface irrigation and from the percolation from the canals. In places where the mud alluvium which separates these two water layers is very thick and impenetrable, the movement of these two kinds of water are independent of one another. Along the extended course of the Nile enormous quantities of water percolate into the depth and follow the underlying course of sand and gravel along the line of inclination of the bedrock. The Government willingly allows to make use for irrigation of this sub-soil water which collects in large quantities, the only stipulation being that the boring must not be nearer than 75 metres to the Nile or the nearest canal.

All these tube-wells are called, without distinction, "artesian wells," although they are almost exclusively worked by means of pumps, and only very seldom (as in the oasis of Chargeh) by the water's own pressure.

As far back as 1904 a number of European companies, for instance, the Artesian Boring and Prospecting Company, the Swiss Technical Bureau, and the Nile Delta Artesian Boring Company, were engaged in the making of artesian wells, but experience has shown that the boring of wells is not remunerative for Europeans, as the necessary small capital outlay of £200 to £400 can easily be obtained by the Arabs, and these perform the work cheaper.

It is a different aspect when companies not only bore wells, but also undertake the irrigation; for such purposes a larger capital is required, and therefore this kind of enterprise has remained in the hands of the foreigners.

Such was the underlying idea of Arno Werther in Cairo, who bought up the above three boring companies and floated under the style of the Upper Egypt Artesian Boring Company, A. Weber and Co., a new company for carrying out the combined objects.

The bore-wells on the estates of large landed proprietors having shown excellent results for a number of years, the Upper Egypt Boring Company, established by A. Werther, of Cairo, in 1909, with a capital of £E250,000, mostly German, endeavoured to give the small land holders the benefit of this system. The company supplies the peasant by means of modern machines with the necessary water for cultivation purposes, against rate of payment consisting of one-third of the crop, but never less than 600 piastres, and the company's claims are guaranteed by a mortgage on the crop and land. In accordance with arrangements made with refineries, the work was chiefly undertaken in the neighbourhood of these, where the fellah had undertaken to grow sugar cane. The company does not engage in the reclamation of sand deserts.

The water-lift existing in the works of the company is 13 metres, its charges are £E3½ for irrigating one feddan of cotton, £E4 for one feddan of sugar cane land.

So far the development of the company has not fulfilled the optimistic prophecies, and even a change in its management will

hardly be able to cause a higher payment of dividend than 2 per cent. or 3 per cent., if as much as that.

We must further consider, while dealing with these tube-wells, that its water is poorer in certain substances, and often contains large quantities of common salt and other obnoxious salts; it is therefore worse, and, nevertheless, dearer than the water taken direct from the Nile.

Not only does the Government provide the wonderful dams but it also bears the cost of the installation and upkeep of all the main supply canals, and of the drainage canals, or "Masrafs," which are very necessary in the lower Delta. Consequently the Egyptian agriculturalist has only to take the water over his field, everything else is done by the Government, and is undertaken without extra payment on the part of the landowner. A special water-tax does not exist in Egypt. The people may take at any time water out of the canals, except during the low water of the Nile, when a strict supervision is kept, for during that time the water is not allowed to flow constantly into the canals, but only in rotations alternately, *i.e.*, in varying periods of about 8 to 14 days, according to the quantity of water that is in the Nile. An extreme case of rotations is 6 days water and 18 none. In order to prevent that during these dry periods cotton fields do not suffer from lack of water, the watering of maize is forbidden from May to June, *i.e.*, up to the arrival of the Nile flood.

No taxes are levied on pumping stations, but a permission from the Irrigation Committee must be obtained, prior to the erection. It is, however, not permissible to irrigate high-lying lands with machine pumps direct from the Nile or the Government canals, because the water of the Nile is reserved for the lower-situated lands, except in the case of a few concessions granted in olden times.

Thanks to the wonderful irrigation installations which Egypt to-day possesses, the cotton planter has almost at all times that quantity of water at his disposal which his crops require.

The cotton field must, naturally, be levelled in order that the water can flow evenly over it; the fields are divided into many squares by little dams, 1ft. high, and these little dams are opened and shut by a kick with the foot, as the soil is very soft. Between the rows of plants are small furrows, so arranged that the irrigation water can run in from the canals, and the water remains there until the soil has drawn it up, or until it has evaporated.

The question as to how many times land in Egypt, which does not receive any rain, requires to be irrigated depends in the first place on the nature of the soil. Sandy soils must be watered very often, in the hot season every 8 or 9 days, or else the plants will suffer. Manured soil also requires abundant water in order that the manure will be fully used up. For fairly heavy soil a watering every 16 to 18 days is sufficient, or else deep ruts will form in the soil, which often cause the roots of the cotton plant to tear asunder or to be exposed to the sun.

Soil that contains salt must be watered more frequently, else an accumulation of salt on account of capillary attraction will take place, and this is injurious to the roots. If the watering of the field is discontinued for two years, they become salty and unfruitful on

account of the rising to the surface of the salty water, but excessively long waterings also loosen the salt of the lower strata and make the salt rise to the surface.

The system adopted by the Government of giving the water out in rotations has been, as a rule, to give in the Delta, during the period of vegetation of the cotton, 7 days water and 7 days none; in hotter Upper Egypt the rotations are 6 days water and 6 days none.

Cotton cultivation requires at the outside 14 waterings, and it is circulated that each watering takes about 250 to 400 cubic metres of water per feddan, with exception of the first watering, which requires nearly double that quantity. G. P. Foaden, who was up to 1910 the General Secretary of the Khedivial Agricultural Society, estimates that every feddan, covered 9 cm. deep with water, requires 350 cubic metres, or reckoning 9 to 10 waterings per year, a yearly quantity of 7,875 to 8,750 cubic metres of water per hectare, which is equal to a yearly rainfall of 800 to 900 mm.

It is held to be particularly important in cotton cultivation to delay the first watering as long as possible, without however injuring the plants, as it is maintained that the roots will then grow from the beginning downwards, as far as possible, and that the formation of strong side roots and healthy stems are encouraged, which will better be able to bear the weight of the bolls.

In too dry a year, owing to insufficient supply of water, even Egyptian cotton has many short fibres. On the other hand, too much watering causes evidently unfavourable results, such as rank growth, dropping off of the bolls, late ripening, and deterioration of the fibre. Generally speaking, cotton plants can better withstand a scarcity of water than too abundant watering. A widely-distributed leaflet on cotton cultivation warns cultivators expressly against the use of too much water, and advises the fields to be watered only every 35 to 40 days up to June, and every 20 days from June to August.

Since 1910 the Government has taken earnest measures against the too copious watering, and endeavours to obtain a better drainage of the soil, for during the last high Nile flood, in the summer of 1909, the existing drains were proved to be insufficient. A great deal of the cause of the small yield of that year's crop is attributed to the rising of the sub-soil water and to the copious watering of the fields. It is quite comprehensible that too much water causes the injurious salt in the soil to dissolve, kills the useful bacteria, and reduces the useful depth of the soil. Should the percolation through the soil really prove to be responsible in the main for the decreasing yields, it will be difficult, considering all the circumstances, to obtain an improvement except by slow stages. It is quite easy to understand that the natives could not adapt themselves so quickly to the suddenly changed conditions from basin to canal irrigation.

In any case, the Government applies itself now with particular attention to the study of the installation and the upkeep of satisfactory drainage, although up to recently more was thought about irrigation than drainage.

On account of the ample summer water, stored up in the Assuan dam, cotton cultivation in the Delta has increased more and more, and the land-reclamation makes continually more progress towards

the north, in districts which, without a corresponding drainage system, could only have supplied unsatisfactory crops. Between the southern part of the Delta, where the natural drainage is sufficient, and the northern low-lying fallow country, which has been recently in part reclaimed, lies a central zone whose crops have gradually decreased, because the soil has been too copiously watered, and has therefore become salty and sour.

After careful experiments on the States Domains and private estates had proved that the cotton crop can be doubled in many places if the sub-soil water can be kept  $1\frac{1}{2}$  metres below the surface, extensive drainage works on the lines of a scheme, approved by Sir William Garstin, have been begun in the spring of 1912, in the central and northern districts of the Delta. It is thought that these drainage works will be completed within four years at a cost of  $2\frac{1}{2}$  million £ sterling, and will transform into culturable land 480,000 feddans in the province of Behera, including the reclamation of the 55,000 feddans of the Lake of Mareotis, and 470,000 feddans in the province of Garbieh, with drainage into the Burlos Lake.

The first sod for this piece of engineering work was turned by Lord Kitchener, in March of 1912, at Ebshan, in the Garbieh Province.

A portion of this reclaimed land is to be allotted, on the initiative of Lord Kitchener, in 5 feddan lots to poor peasants, in such a way that they will only have to pay for by easy instalments within 15 years, the Government's cost of the reclamation; indeed, a beginning with this land distribution has already been made in 1912, when 500 and 1,000 feddans were given out. These methods correspond with the views of Lord Kitchener, who wishes to prevent that the lion share of the yield of the soil should flow into the pockets of land speculators.

The method of reclamation of the inland lakes which the Government has lately taken up had already been successfully applied, on a smaller scale, by the Aboukir Company. This company, which was established in 1887, pumped the water out of the smallest marine lake, called the Aboukir Lake, which measured  $12\frac{1}{2}$  by  $9\frac{1}{2}$  kilometres, and had its surface of soil one metre below the sea. This former lake is now a most flourishing estate, in a high state of cultivation; originally the area was 30,000 feddans, the major portion of which has been gradually sold at good prices, and now there remains only 10,000 feddans to the company.

#### EGYPTIAN FARMING.

In accordance with the wonderful fertility of the soil, the resources of the country are almost exclusively agricultural, and farming products will remain for a long time the greatest source of the wealth of Egypt.

In the main there are cultivated: For their own supply, although that does not cover the whole of the indigenous consumption, cereals, such as maize, wheat, barley, dry-millet, and rice; leguminous crops such as beans or Fûl, the Egyptian national dish, peas and lentils, of cattle food crops especially the Egyptian clover, lupins, lucerne, green maize, Greek hay and hen-millet (*Panicum crus*

gallum), further sugar cane, sesame, earth-nuts, castor, onions, garlick, Spanish pepper, tomatoes, artichokes, celery, and other vegetables, cucumbers, marrows, and melons.

As a *commercial crop*, and for ready cash, they have the cotton crop. This is the real foundation of to-day's prosperity of the country, and almost its only source of income, as far as international commerce is concerned. One-third to one-half of the available land is put down under cotton, and this area is usually increased, when, during November/December, high prices for cotton rule.

In the year 1911/1912, of the 7,683,000 feddans of the culturable land in Egypt 3,039,000 feddans were situated in Lower Egypt, 2,446,000 in Upper Egypt; altogether 5,285,000 feddans were cultivated. 2,397,000 feddans were lying fallow.

The chief products were :—

Cotton .....	22·42 %
Maize .....	23·82 %
Clover and other cattle food crops .....	21·58 %
Wheat .....	16·70 %
Broad beans or Fûl .....	6·74 %
Barley .....	4·74 %
Rice .....	2·94 %
Cane sugar .....	0·65 %
Fruit and vegetables .....	0·37 %
<hr/>	
	100·00 %

The whole of the culturable lands in Egypt is divided, according to the systems of irrigation, in the two large classes of "Raye" and "Sharaki" lands.

The "Raye" land is irrigated directly from the Nile flood, and keeps its humidity after the receding of the water until the crops, which grow upon it, are ripe.

The "Sharaki" land is at too high an altitude to be reached by the Nile floods, therefore it must be irrigated by artificial means.

"Baali" land is land which will bear fruit apparently without water, *i.e.*, where water penetrates invisibly.

"Tawalef" is the name given to land which is barren.

The irrigation and climatic conditions permit a winter, a summer, and an autumn cultivation.

The *winter cultivation*, or "el Shitwi," which comprises clover, wheat, beans, lentils, barley, onions, and flax, is the most important, and can only be used on "Raye" fields. The sowing begins immediately after the receding of the flood, *i.e.*, in the middle of October, and is carried out in stages running from north to south, last of all in the Delta, towards the end of December; the corresponding crops are gathered in Upper Egypt in February, in Central Egypt in March, in the Delta in April. *Summer cultivation* lasts from April to August or October, and can only be used on the Sharaki lands; it comprises chiefly cotton, rice, maize, and sugar cane, also indigo, millet, cucumbers and vegetables of all kinds, but many of the plants

of this kind of cultivation require a longer period of growth, often until autumn and even part of the winter. Cotton is one of these, it ripens as late as November and December. Moreover, cotton is entirely grown during the summer, and it increases in area at the expense of the cultivation of wheat. The real autumn or "Nili" crop, *i.e.*, flood cultivation, is of a secondary consideration, it falls between the months of July and October, and comprises almost exclusively maize, in Upper Egypt a little rice, "durra," barley, and sesame.

The three cultivations are not completely distinct, but one cultivation overlaps frequently the next.

The same soil cannot grow the three cultivations in *one* year; only about 40 per cent. of the arable land is planted more than once in one year. Nevertheless, some portion of the fields is always cultivated at any season, except that it lies purposely fallow.

Of the 5,285,000 feddans culturable land in the year 1911/12 2,395,000 feddans were repeatedly planted, consequently the total cultivated area amounted to 7,681,000 feddans, and was sub-divided as follows :—

Winter crops .....	3,737,000	feddans.
Summer crops .....	2,181,000	" ,
Autumn crops .....	1,763,000	" ,
<hr/>		7,681,000 feddans.

In the Delta, where sufficient irrigation is possible outside the flood time, the soil is sometimes cultivated four times in the three years, in Upper Egypt about seven times in six years; summer cultivation has only lately been made possible there through irrigation. As the period of growth of cotton is exactly the time of the flood, it is only possible to grow cotton in Upper Egypt, where favourable water distribution and drainage exists.

Generally, the fellah is inclined to grow the well-paying cotton in succession at the expense of the soil, and too many crops in one year on the same soil impoverish it; only the fact that he must also grow his own food crops and his forage causes him to rotate his crops and to grow mixed crops. The fellah must grow a lot of clover in order to have forage for his cattle, and beans for the summer months, when there is no pasture to provide forage.

The individual sections of the land change, therefore, every year their aspect, as the crops grown on them change, in order that the soil may have time to recover before the same crop is planted again two or three years hence. Cotton planted on the same ground two or three years running gives a low and unprofitable return.

The *rotation of crops* on salt lands are, of course, different from those on the best Delta land, and different in Lower Egypt from those in Upper Egypt.

In salt lands, where rice must be grown, the rotations are something on the following lines :—

In the first year . . Cotton and then clover.

In the second year Maize, then cereals or beans.

In the third year . . Rice, then clover.

On good Delta soil, with a two years' rotation, the smallholder in particular practises the following :—

In the first year ... Cotton followed partly by clover and partly by cereals.

In the second year Partly clover, partly cereals, and then cotton.

For the large plantations and Domains, a three years' rotation of the following order is advantageous :—

In the first year ... Clover or beans, then fallow or maize.

In the second year Wheat, barley, flax or potatoes, then maize.

In the third year ... Clover between the still standing maize, and then cotton.

Or in a four year rotation :—

In the first year ... Clover, then fallow.

In the second year Cotton.

In the third year ... Clover, beans or cereals, then sesame or maize.

In the fourth year Wheat, then maize.

Sugar cane, which is of great importance to Egyptian agriculture, is planted very rarely in rotation with cotton.

Cotton receives the best place in the rotation, after clover or any leguminous crop; great care is bestowed to its cultivation; the manuring, the irrigation, in short, everything is arranged and planned with a special view for the cultivation of cotton.

On recently reclaimed salt land, the first crop which is planted is always rice or Samar, both of which require abundant and regular irrigation, and are able to withstand the salt in the soil, then hen-millet (*Panicum crus gallum*), a good forage, next clover, and only in the third or fourth year can cotton be planted.

The annual white flowering Alexandrian clover (in Arabic, Berseem)—“*Trifolium Alexandrinum*”—which gives in one period of cultivation 5 to 10 cuttings, is the predominant catch crop with cotton. This kind of clover is generally planted in autumn after previously irrigating, and is mostly sown while the cotton is still standing; it affords during winter a valuable forage for all animals, especially horses. One hardly ever sees a cab-driver in the streets without a bundle of Berseem on the box. In the spring the clover is ploughed into the soil to serve as a green manure, thus fulfilling two duties, viz., as a forage plant, and as source of nitrogen. As the fields during five months serve as pasture land, the soil becomes particularly rich. According to Mr. Foaden, a better crop is produced on a naturally rich soil if cotton, after a dressing of manure, is sown after maize or fallow, instead of cotton following directly after berseem. In any case, berseem improves heavy soils mechanically, as it opens up the earth, makes it lighter and porous, whilst it gives organic matter to sandy soil and enriches both kinds with nitrogen.

Cotton as a “mixed cultivation,” i.e., growing of cotton along with other produce, is resorted to in other parts of Africa, and in

India; it was formerly extensively practised in Egypt, but since 1862 has been given up by all intelligent farmers, and at present is as little in use as in North America. Cotton is mostly planted by itself, and even the growing of vegetables and melons has disappeared everywhere since the perennial cultivation of cotton has been given up.

*Draught Animals.*—Oxen and buffalos are used as agricultural draught animals; in Upper Egypt oxen and camels. The usual daily performance of a ploughing team is about half a feddan; it is estimated that 10 feddans of land can be worked in one year by one team.

The agricultural implements used by the fellahs are still of a very primitive kind, they are the hand-hoe or "fass" and the old ancient "Belledi" plough, from the times of the Pharaohs; it is nothing else but a kind of a scraping pole with a two metres long beam, on which the draught animals are harnessed, in a yoke; the end of the scraper which goes into the soil has a crooked piece of wood fastened on, which ends in three iron points. This piece is pushed into the soil before the animals begin to draw, and the ploughing has more the effect of loosening the soil than ploughing it up in furrows. As a matter of fact, this wheelless frame is more like a one-spiked cultivator. But it hardly costs 20 piastres, does not require repairing or upkeep, no lubricating, no grinding of the blade, no setting up of its parts, and these are all important points for the fellah. This native plough is well suited to the Egyptian soil; a modern plough specially adapted for Egypt does not seem to exist yet, and this may account to a great extent for the disinclination of the fellah to use a European plough. The few foreign ploughs that are employed so far are mostly English.

Other Egyptian agricultural implements are the following: The "Kassabia" serves for levelling, it is a sort of sledge; for the levelling of the upper surface the "Zahaffa," a simple wooden beam upon which the driver stands, is drawn over the field by oxen, and may be said to take the place of our harrow or light rollers. Sometimes this harrow is substituted by the "Kumfud," which is a roller covered with iron spikes. For forming ridges the "Battana," a kind of sledge-like wooden frame, 90 cm. long, is used.

However simple and ancient the Egyptian methods seem, the experience which the fellah has gained with them, through using them for thousands of years, have made him to be a cultivator who, on an average, is hardly less advanced than some of those of the more progressive European nations.

On the large plantations we find in the place of the old Egyptian plough, locomotives, steam ploughs, and agricultural machines of all kinds. In 1862 the first rather unsatisfactory steam plough of Fowler came into Egypt, and Mr. Max Eyth deserves great credit for its introduction and improvement; he became later the founder of the German Agricultural Society. From 1863 to 1866 he was the chief engineer to the Prince Halim Pasha, and his letters on his experiences during this period are very amusing. Next to Fowler the firm of Clarens, Ltd., of London, supplied many steam ploughs of excellent quality. A steam plough of Clarens, Ltd., of 16 h.p. costs £E3,000, does the work of 70 oxen, and uses one ton of coal per

day; with the grubber it works in the first ploughing 20 feddans per day, in the second ploughing 28 feddans, and with the ridge plough 35 feddans. German steam ploughs of the firm of J. Kemna, Breslau, are also at work in Egypt. Steam ploughs usually ploughing about 36 cm. deep are almost exclusively used on the large Egyptian estates, as they replace the draught animals, which are frequently subject to epidemics in Egypt; it is, however, impossible for the small holder to invest in this kind of plant, and the lending out of steam ploughs is difficult and expensive, and owing to the bad condition of the roads and the fragile bridges is only very little practised; it is necessary to strengthen the bridges by two horizontal beams whenever a locomotive has to pass over one.

At the Agricultural Exhibition at Cairo in 1912 the firm of E. Sack, of Leipzig, had, for the first time, a large selection of iron ploughs, cultivators, and drilling machines. Of course, the competition of Germany is very difficult with England in agricultural machines, not only because English manufacturers have been established in Egypt for a number of years, and have agents in the country with showrooms, but because the large agricultural companies are mostly under British control and therefore prefer almost exclusively English machines. Nevertheless, the German importation of agricultural and electrical machinery, especially of steam locomotives and pumps for irrigation purposes, is second in importance. It must be borne in mind that machines and similar plant are not always wanted in the best and the most lasting quality, as a number of people are in the habit of receiving commission on the purchase of these machines, and, naturally, they prefer to make frequent purchases at short intervals.

*Agricultural Schools.*—The first agricultural school in Egypt was founded by Mohammed Ali, under French management. For a long time nothing more was heard of it, and consequent upon the small flood of 1888 the Minister of Public Works caused, in 1890, the erection of a higher-grade Agricultural School, and of an experimental station at Giseh, in which young Egyptian landowners could be instructed in a four years' course in all technical branches of agriculture, the use of agricultural machines, improved agricultural implements, and the management of new kinds of crops; in connection with this school there exists a veterinary department. This Agricultural School at Giseh, which, in 1910-11, had 196 scholars, is to be gradually converted into a High School. There are also nine industrial schools in Egypt, five of which possess agricultural branches, which prepare young students in a course, chiefly practical. The Agricultural Department is now setting up in several places elementary and intermediary agricultural schools. The first intermediary school of this type was established in 1911 at Mushtohar; in the morning the students listen to academical lectures, and in the afternoon they are engaged in practical farm work.

Valuable services for the promotion of Egyptian agriculture have been rendered by the Khedivial Agricultural Society in Cairo, which was founded in 1898, and is under the presidency of Prince Hussein Kamil Pasha, an uncle of the Khedive. It is the largest agricultural society in Egypt, and the largest landowners of all parts of the country and numerous Government officials are members. The Society

undertakes experiments in plant and cattle breeding, studies the destructive insects, organises every two years a well-attended agricultural exhibition in the compound of the Society at Gesireh-Cairo, and takes in many ways a real interest in Egyptian agriculture. In 1904 the Society was reorganised, and at the same time a closer relation with the Government was created, the Government raising their yearly subscription from £E3,000 to £E6,000. At the same time the reduction of the member's fee from £E5 to £E1 caused a large increase in the membership, which was 243 in 1904, 3,131 in 1905, and eventually about 5,000. Meanwhile, it is true, the number of members has shrunk to 1,000, and the yearly Government subsidy to £E5,000, but the Society makes a profit on the sale of artificial manures. From the beginning the Society had made arrangements for the supply and distribution of a good quality of seed and artificial manure at a cheap price; the Government gave for this purpose considerable advances to the Society, for which it was charged only 2 per cent. per annum.

After the establishment of the Government Agricultural Department, which took over the greater part of the scientific staff of the Khedivial Agricultural Society, the latter engaged a number of German experts in agriculture, botany, chemistry, and entomology, and besides the central offices at Gesireh, where the exhibition grounds and an entomological laboratory are situated, the Society established an experimental farm at Bahtim, near Shubra, the latter comprising 130 feddans; here the breeding of plants and cattle are being investigated. The dwelling-houses and offices of the staff are also situated there. The experimental farm was started only in 1912, and promises to give good results.

The Society publishes the "Journal of the Khedivial Agricultural Society," since 1905, an interesting "Yearbook," which has, however, only appeared in the years 1905, 1906, and 1909.

Besides the Khedivial Agricultural Society, the following organisations deserve to be mentioned:—

The *Union Syndicale des Agriculteurs d'Egypte*, founded in 1902, with the object of promoting agriculture in all kinds of ways, particularly by giving practical advice and statistical information; it has also organised a co-operative system for the supply of seed. The Association has a somewhat similar programme as the older Society, but it is quite independent from the Government. It publishes monthly the "Bulletin de l' Union Syndicale des Agriculteurs d' Egypte."

Another Society for the study of agriculture in Egypt is the *Cairo Scientific Society at Giseh*, established in 1906, whose members are chiefly Englishmen engaged in the Egyptian Government offices. The meetings are held every 14 days, and an account of these is published in the "Cairo Scientific Journal," which supplies very valuable information.

The Government Domains, which are spread over the whole of the country, try to teach the Egyptian farmers the proper ways by setting them an example in the management of their own concern, and also by promoting movements for the public welfare. The Domain has a large plantation of 14,000 feddans at Sakha, where agricultural experiments are carried on, on a large scale, and up to

now the Domains had supplied the Khedivial Society with large quantities of selected seed for distribution among the planters of the whole country. It is the intention of the management to undertake on its land experiments for the combating of cotton pests, for which purpose the Khedivial Society had not sufficient land at its disposal. The Domains are also testing the use of artificial and other manure for cotton, and are studying all kinds of problems relating to cotton cultivation. As to further promotion of farming, up to 1910, the Ministry of the Interior interested itself, on the part of the Government, in the organisation of an insect campaign, and the Ministry of Finance published reports on the area of cultivation and the quantity of seed distributed. The Ministry of Public Works looks after the construction of the roads, dams, canals, and irrigation works.

As a methodical campaign against the insect pests, a systematic improvement of the condition of the soil and several other questions can only find an adequate solution through a central body; the opinion, especially in English cotton circles, was expressed, that a special Department of Agriculture should be instituted, and towards the end of 1910 this was done; this department is at present a branch of the Ministry of Public Works in Cairo.

The Agricultural Department commenced its work in 1911 under the Director-General, Gerald C. Dudgeon, who has had experience in West Africa, and also in the cultivation of East Indian cotton. The whole staff of scientific inspectors and the experts of most of the sections of the Khedivial Agricultural Society, who had so far received Government support for the carrying out of their practical experiments in scientific research, were transferred to the Department of Agriculture. The Horticultural Society of Cairo was also transferred to the new Department; it instructs verbally, by publications and example.

The Department established in the first year of its existence 24 experimental and model farms, spread over the whole country, covering altogether an acreage of 106 feddans. It is intended to increase gradually the number of these farms to 200; in 1912 there were 42 farms in existence; under the management of the able botanist, Mr. W. Lawrence Balls, the Department created a seed-breeding station for cotton, and made arrangements for the free distribution of good seed to poor planters, and for the studying of the pests of cotton plants, the various kinds of manure, and methods for the improvement of the soil.

The demonstration farms already mentioned are organised in the following practical way. A large land holder is asked to place a piece of his land at the disposal of the Agricultural Department, for which it allows him the same profits which the neighbouring land gives. The Department has, however, unrestricted authority as to the methods of cultivation of this land to be applied by the labourers of the landowner; the results obtained everywhere show that the net profit is in almost all cases strikingly higher than what was guaranteed. The neighbouring farmers have, consequently, been convinced of the better methods of the government inspectors, and are imitating them. It was particularly intended to demonstrate on these farms that cotton can be better grown with less water than is usually employed, and that a better crop can be obtained when the plants

are not sown so closely together as is mostly the case at present. Fifty per cent. of the seed of the first picking from these demonstration farms are supplied to the Government for distribution.

Among the publications of the Department are: "The Agricultural Journal of Egypt," a monthly review on the state of the crops, widely circulated bulletins on questions of agriculture with special reference to cotton. One of the latter was put into every sack of cotton-seed sold to small holders, and another, dealing with the campaign against the cotton pests, was publicly read out in the villages.

It is said that in 1913 the Agricultural Department is to be formed into an independent Agricultural Ministry. It is a deplorable fact that a great deal of petty jealousy, which is hardly concealed, exists between the Agricultural Department and the Khedivial Agricultural Society, and this, of course, renders the much required co-operation between the two very difficult.

*Estimates of the Crops.*—The General Produce Association of Alexandria sends at the end of each month an enquiry sheet with questions to their correspondents up-country, and their answers, together with private information of the members of the committee, form the basis for the public reports as to condition of the plants, the weather, the insect plague, and irrigation. The first estimate of the crop, in figures, is issued in their report of the first week of November, and the December report is the final estimate.

As the reports of the planters are frequently untrue and are influenced by their personal interests, and as even the reports of the local authorities leave much to be desired, it is evident that statistics formed on such a basis cannot be relied upon, and the value of these statistics of the Alexandria General Produce Association is therefore questionable.

The Survey Department publishes daily weather reports and monthly reports on the water conditions of the Nile; it also reported during two years as to the cultivated areas, but this latter work has been unfortunately discontinued on account of the cost. The only census of cultivated areas is carried out by the Serrafs or the land-tax collectors, but not much confidence can be placed in their method.

The Agricultural Department of the Ministry of Finance publishes also monthly reports in percentages on the condition of the crops; in these the comparative number of 100 is taken to mean the average crop of the last 10 years.

Lastly, the Director-General of Statistics sends once per year an enquiry form relating to the development of the crop to his correspondents.

Meanwhile, the new Agricultural Department has developed its own statistical methods and issues, in combination with the Statistical Office of the Ministry of Finance, since October, 1912, monthly circulars which give particulars of the development of the Egyptian cotton crop from the sowing to the foreign consumption. The method of calculation at present employed, which is based on the quantity of seed sold and the output of the ginneries, gave so far results which were differing remarkably from the estimates made by the tax collectors.

## IMPROVEMENT OF THE SOIL AND MANURING.

Even if the Nile water possesses a large quantity of sediment and thereby contributes to increase the natural fertility of the deep clay alluvial land, this kind of manure having only little organic matter does not suffice for the requirements of cotton; it contains only 0·12 per cent. of nitrogen, 0·21 per cent. of phosphoric acid, and 0·58 per cent. of potash. For this reason the fellah has endeavoured for many years past to improve his cotton field by manuring, and this improvement of the soil can be obtained not only by fertilisers, but by crop rotation and green manuring.

For manuring proper the fellahs use rubbish heaps or "Koms." These are the remains of numerous ancient towns and villages; they are rich in nourishing salts. This refuse soil, called "Sebak," is being quickly used up; it contains about 12 per cent. of salts, namely, saltpetre, soda, and ammonia. Great care must be applied in using this refuse, as the soil contains numerous injurious substances. Usually 20 tons of this refuse earth are put on one feddan, and as it is considered ownerless it only costs the carriage. At times this refuse earth is so short of nitrogen that it does not pay the transport on the backs of camels. As the dwellings of the Egyptian farming people have been made since ancient times of mud-bricks, that have never been burnt, but have been merely dried in the sun, the weather soon pulverizes them, and this dust mixed with the remains of the food of both men and animals, gives a most valuable manure. Other natural manures are also used, as, for instance, animal manure, except that from larger domesticated animals, which in Egypt is made into large cakes and is then used for fuel; guano of the numerous pigeons of the villages along the Nile valley, also Pudrette, the sewerage products of the towns; the silt of the canals, wood ashes from the cotton stems, and the straw from the wheat, for which no other use can be found at the time; the rubbish of the town, and the guano of the bats which is obtained from the numerous caves and rock crevices in the desert.

In 1909 the *Compagnie des Engrais d'Egypte* (*Manure Company of Egypt*) has been established with a capital of £E30,000, which, in three places of the neighbourhood of Cairo, works up the organic refuse of these towns: for example, bones, blood, meat, &c. The manure thus obtained is sold to the large farmers, and the fellahs begin to make an increasing use of it. In 1882 and in 1896 two similar companies were established, but they had to give up business very soon. The Cairo Sewage Company also supplies manures.

Fresh farmyard refuse is not valued as highly as that which has been lying in heaps for two years, and therefore the best planters only use old manure. According to Mr. Foaden 10 to 15 tons of this old manure are required for one feddan. In the process of the production of this manure, earth is used as a covering, and its composition depends therefore a good deal upon the components of the earth that has been used. It contains only a little water, on an average of 5 to 6 per cent., some 1·56 per cent. of potash, 0·4 per cent. of nitrogen, and 0·25 per cent. of phosphoric acid.

The amount of farm manure, refuse, &c., which are to be had

do not supply to-day's increasing demand, especially as the perennial canals give very much less Nile silt on the fields than was formerly the case with basin irrigation; up to a certain degree, berseem helps as a green manure.

Artificial manure is bound to come more and more in the foreground. This kind of manuring has been studied in Egypt only since 1896, and in 1901 the Khedivial Agricultural Society distributed among the Egyptian farmers for the first time £E6,000 worth of artificial manure at cost price. In order to make the sale of artificial manure as cheap as possible, the Government repeatedly lent to the above Society large sums, for example, in 1906 £E100,000 at 2 per cent. interest per annum. After this the Government refused to advance more money and left the importation of artificial manure in the hands of merchants, but no custom duties have been levied for a number of years on these fertilisers. In fact, the import of artificial fertilisers has substantially increased since then, and in the year 1910 35,000 tons, of a value of £E296,000, were imported, namely 30,000 tons of Chile saltpetre, 3,300 tons of superphosphate, and 1,600 tons of ammonium sulphate. Germany was interested in this importation only with 900 tons of superphosphate and potassium nitrate to the value of £E3,000. The customers were, principally, the Agricultural Bank and a few large agricultural companies, which buy large quantities and are content with a small profit, although they sell to the small peasants. Artificial manuring, generally speaking, is rendered very difficult because the poor tenants are unable to bear the cost, and the landowner refuses to do anything for him because a large crop does not benefit him, but the tenant.

In 1909/10 only 5 per cent. of the cultivated land were artificially manured.

Artificial manuring must, indeed, be very carefully carried on according to its kind, quantity, and the composition of the soil, and requires a most careful study in order that the development of the cotton plant be not pushed on at the expense of the fibre, and that the development of the fibre is not becoming too late. Egyptian cotton has, as most of the fine staple kinds, a tendency to ripen late, and a late ripening must be avoided at all costs.

Among the artificial manures in Egypt are to be mentioned:—

*Nitrogen*, namely, Chile saltpetre (sodium nitrate in the main), ammonium sulphate.

*Phosphoric acid*, in phosphates of different kinds.

*Potassium salts*, such as potassium chloride and potassium nitrate; the latter is preferable, but must go hand in hand with an abundant supply of chalk as manure; so far, the manuring with potash in the heavy Delta soil has not had good results with cotton, but on the other hand, it has proved useful on the sandy soils.

Nitrogen manuring is on the whole less needed, as usually before cotton cultivation clover has been ploughed under as a green manure, instead of cutting it a third time at the beginning of the year; even if the forage crop is grazed off, the following cotton has sufficient nitrogen, except on very poor soil. If the clover is cut and harvested it alters the case.

According to Mr. Foaden, the best manure mixture for Egyptian cotton is superphosphate and Chile saltpetre; of the former, if

it contains 16 to 18 per cent. phosphoric acid, usually about 4 cwts. are sufficient for one feddan; it is applied either after the last ploughing or two months after sowing; on poor soil 150lbs. of salt-petre should come on one feddan, and 100lbs. on good soil, as soon as is possible after the thinning out of the young plants; it is specially advantageous for helping the young plants over the critical time of their early growth. Ammonium sulphate is for this purpose not much good, as it acts too late.

The prices of artificial manure for one ton franco wagon Alexandria were in the autumn of 1912 15½ per cent. Chile saltpetre, 1,170; 16 to 18 per cent. superphosphate, 295; 43 to 47 per cent. superphosphate, 820; 20 to 21 per cent. ammonium sulphate, 1,530 piastre tarif.

The time for manuring differs considerably. Some spread the manure over the land and plough it in before the ridges have been thrown up. Others put manure in the furrows between the ridges and cover it then with the remainder of the old ridges. Both methods can be recommended, and are certainly better than the method which is commonly in use, and consists in manuring only after the sowing has taken place; the manure is put either into the ridges and hoed in with the "fass," or it is put in in handfuls directly under the roots of the plants when they are a few inches above the soil. The latter method requires much more labour, and does not give any special results.

Since 1897 phosphate of a strength of 50 to 72 per cent. similar in quality to that of Tunis has been discovered in numerous places in Egypt, along the coast of the Red Sea, along the Nile, and in the western oases. For the exploitation of these phosphate mines a good deal of German capital is being employed lately. As long as the phosphates are sufficiently disintegrated they are used without any further preparation for manuring.

In Upper Egypt two kinds of earth are used as manure, viz., "Tafla," which is a blue-black clay, containing nitrogen in the form of sodium nitrate, and "Marog," which is used on account of its nitrogenous contents. Both these soils have considerable value as manure.

#### THE ECONOMIC SYSTEM.

*Ownership of Land.*—Formerly all land used to belong to the Government; since ancient times all land was the property of the Sovereign, and its use was subject to a payment of one-tenth, or of a tribute. The privileged tithed land, or "Ushuri," which was taken away from the original owners, after the subjection to Islam, and divided among the successful conquerors, was relatively small, and paid only a trifling tax. But most of the land was counted as the higher-taxed, or "Karadshi" lands, which the triumphant Islam allowed the original owners to keep, but this kind of land had to pay high taxes to hereditary tax-collectors. Mohammed Ali declared by a decree, in 1808, all titles of private landowners void and instituted the Government as owner of all the land; in 1813 he ordered the whole land to be surveyed, and gave every peasant of age 3 to 4 feddans of land, secured by title-deeds, for life. In 1854 a law was passed for the hereditaryship of the use of the land, and after 1858

the land could be sold or rented, and even given in mortgage. Thus private ownership of land was in a sense proclaimed, although not literally. From 1861 Europeans were allowed to acquire "Karadshi" land in Egypt and the law concerning the "Mokabala," which was due to Ismail Pasha's lack of money, brought, in 1871, full freedom of land: now every one could acquire free possession of his land if he paid his tax for six years in advance. Of this permission, and of the later facilities in the acquisition of land, full use has been made.

The important law of March 14th, 1899, abolished the difference between the two kinds of Ushuri and the Karadshi lands, and fixed for the future the land tax for each feddan of agricultural land at 28·64 per cent. of the rental, or, if one considers this to be 5 per cent. of the value of the land, as a yearly tax of 1·43 per cent. on the land value. Up to 1907 the survey of the entire cultivable land of 7,000,000 feddans was completed, just as well as it is carried out in Europe, and transfers of property are registered in the Doomsday Book exactly as in Europe. The right of ownership is therefore quite settled, and jurisdiction and other securities are entirely satisfactory in Egypt.

*Distribution of the Land.*—In the census of 1907 of 11 $\frac{1}{4}$  million inhabitants 2,440,000 persons, or 41 per cent. of the entire male population, were stated to be engaged in farming, and 1,441,000 were, in 1911, owners of land.

At the present day the land belongs partly to the State Domains and partly to special land companies and mortgage banks; the Khedive, his relations, and a few rich pashas own large tracts of land; then there are Turks, Arabs, Greeks, and also a small number of other Europeans who own land on a large scale, but as the former two are Oriental, and consequently bad organisers, they do not manage their own estates, but leave that work to some native bailiffs. The Wakf, the board of religious institutes for Mohammedan and Coptic churches and schools, has a certain ownership of land, but the major portion of the cultivated land belongs to the peasants, as is seen from the following table.

In 1906 the land ownership, with exception to the Government lands, was divided into lots:—

	Egyptians.		Foreigners.	
	Area in feddans.	No. of owners.	Area in feddans.	No. of owners.
Below 5 feddans ..	1,259,670	1,002,806	4,414	2,899
From 5 to 10 ..	539,313	76,297	4,951	666
" 10 to 20 ..	515,217	37,242	8,311	575
" 20 to 30 ..	271,533	11,112	7,260	376
" 30 to 50 ..	317,342	8,246	4,159	355
Over 50 ..	1,763,175	10,921	593,427	1,554
Total .....	4,666,250	1,147,324	632,522	6,425

In comparison with 1896, in which year the foreign owners were for the first time registered, the remarkable result is shown that the lowest classes of natives had a large increase

as regards number of owners and area owned, whilst all the middle classes had a decrease, and the upper class an increase. Land owned by foreigners had, since 1896, increased by 10 per cent., whilst the number of foreign owners in consequence of the formation of European land companies had decreased.

In 1910 the Ministry of Finance stated the distribution of land among owners to be as follows :—

		Total area in feddans.	No. of owners.	
			Per cent.	Per cent.
Up to	1 feddan ..	364,290 = 6·67	782,639 = 56·22	
From	1 to 5 "	1,005,322 = 18·40	464,442 = 33·37	
"	5 to 10 "	530,231 = 9·70	76,139 = 5·47	
"	10 to 20 "	507,050 = 9·28	36,707 = 2·64	
"	20 to 30 "	247,439 = 5·02	11,233 = 0·81	
"	30 to 50 "	323,883 = 5·93	8,390 = 0·60	
Over	50 "	2,458,574 = 45·00	12,414 = 0·89	
		5,436,789 = 100·00	1,391,964 = 100·00	

Of the total land 720,230 feddans were owned by foreigners, and these foreign owners were sub-divided as follows :—

3,924	owners up to	5 feddans totalling	6,688	feddans.
751	" from	5 to 10 "	5,619	"
654	"	10 to 20 "	9,544	"
322	"	20 to 30 "	7,963	"
366	"	30 to 50 "	14,499	"
1,561	" over	50 "	675,917	"
7,578			720,230	feddans.

Of the 1,247,081 owners of land with less than 5 feddans, 360,000 do not cultivate cotton.

*Small holdings.*—There is no doubt the bulk of the land is in the hands of the fellahs, and as is the case almost everywhere, the cultivation of cotton is specially suitable for small holders. Except the few large Domains in the Nile Delta where cotton is planted uniformly on thousands of acres, we find chiefly small holdings, and even those belonging to townpeople and being worked by day labourers, are gradually becoming transferred to peasants, in consequence of their ardent desire to acquire land, this possession being considered up to now the only kind of wealth worth having. In these land sales the mortgage banks were offering willing help, at least so long as the price of land was rising so rapidly as up to the crisis of 1907. The areas which each one can call his own are very different in quality of the soil and position of the land. Wealthy people own hundreds of feddans, whilst the poor people only own a few "Kirats," and work, as a rule, for a daily wage on the large farms. On an average the fellah owns, in the most fruitful districts of Lower Egypt, 1 to 5 feddans. The small owner of about 3 to 4 feddans farms his fields for his own account, with the help of his family and a buffalo, but at the time of hoeing and harvesting he requires outside help. Women and children are useful in field work, but the women are under certain restrictions owing to Mohammedan customs.

Latterly, even the fellahs living on the edge of the desert have been improving to a certain extent the sandy soil by repeated cultivation of lucerne, which adds organic substances to it, and by careful watering it. A good few feddans of culturable land have been reclaimed in this way.

The Government on the one hand wishes to increase the number of small holders and gives them the preference in their annual land sales, but on the other hand a large number of fellahs are annually sold up, as in spite of the repeatedly reduced taxation, since the British occupation, the taxes are still heavy, and as they have to suffer frequently from the payment of usurious interest to moneylenders. To some degree this is caused by the fact that the Egyptian fellah is accustomed to live without making provision for a rainy day; at weddings and other festivities he incurs ridiculous expenditures; as soon as he has money saved up he buys new land on mortgage without considering maturely whether he can afford to cope with the larger expenses caused through the increased area. Thus the daily newspapers are full of advertisements of bankruptcy sales.

It is not only the native population who inhabit the fertile Nile Valley, chiefly as fellahs, but also the capitalists: Arabians, as well as immigrated Syrians, Greeks and Northern Europeans prefer to invest their money in agriculture in Egypt, as they look upon the possession of land as safe and remunerative. The large banks also become temporary owners of land through the transfer of mortgaged property.

The *land companies* do not, as a rule, undertake the actual farming. With the exception of the State Domains, and of a few estates belonging to native landowners, there are in the black loam district of Lower Egypt very few extensive cotton plantations under direct European management, as they generally do not prove remunerative, as will be explained in a later chapter. It is much easier for large concerns to let the land than to farm it with the help of daily labourers.

The Aboukir Company, for example, which we have already mentioned, is one of the oldest land companies, which, from its original 30,000 feddans, owns to-day only 11,000 feddans; it leases these on an average of £5, and a family of five generally takes eight feddans, of which four feddans must be grown with cotton each year, which crop the Company takes over on account of the annual rent, whilst the tenants may dispose of the other crops from the remaining four feddans (clover, wheat, maize, and so on) at will. The tenant usually has two buffalo-cows, the milk of which brings in about £30 per year, and the vicinity of Alexandria gives the tenants a ready market for the sale of poultry, eggs, and vegetables. The rent is amply covered, under normal conditions, from the cotton crop. The Company pays the land tax and controls the distribution of the water, but the tenants must look after the upkeep of the canals and irrigation.

Much more profitable to the companies than this leasing is the work of land reclamation, which was undertaken from their very beginning. Land was bought at a low price, improved, and then sold or leased. In the low-lying northern provinces of Lower Egypt

are extensive tracts of soil containing salt, and towards the south-west and south-east large tracts of sandy soil extend which can be bought relatively cheap. The major portion of these areas is not able to produce cotton at once, and it is only after several years of careful irrigation, drainage, working with steam cultivators, application of manures, and lastly, after the cultivation of other crops, such as rice, clover, and barley, according to conditions of soil, that the first cultivation of cotton can be attempted.

Once this stage has been reached it is hardly worth the companies while to undertake the cultivation, and, consequently, this improved land is let as soon as possible in small plots to the peasants, and after a few years, when the soil has been improved, the companies endeavour to sell it at the best possible price.

The following is a list of the principal land companies :—

#### LAND COMPANIES.

	Seat.	Founded	Ordinary shares.	Debentures.
Société Anonyme du Béhéra	Alexandria	1881	£E. 250,000	£E. 683,280
Aboukir Company, Limd. . .	London	1888	£ 300,000	£ 100,000
Société Foncière d'Egypte	Cairo	1896	£ 217,000	—
Société Anonyme Agricole et Industrielle d'Egypte . . . .		1898	Fr. 12,500,000	Fr. 33,067,000
The New Egyptian Co. . . . .	London & Cairo	1899	£ 330,600	£ 123,000
Soc. Foncière des Domaines de la Daira Dranet Pascha	Alexandria	1901	£ 340,000	—
The Warden Estate Co. . . . .	Cairo	1903	£ 145,750	—
Soc. Anom. du Ouadi de Kom Ombo . . . . .	"	1904	£ 1,000,000	—
Egyptian Delta Land Investment Company . . . . .	London & Cairo	1904	£ 324,250	—
The Corporation of Western Egypt . . . . .	London	1904	£ 498,000	—
The Egyptian Enterprise and Development Co. . . . .	Cairo	1904	£E. 400,000	Fr. 1,000,000
The Nile Land and Agricultural Company . . . . .	Alexandria	1904	£E. 300,000	£E. 561,000
Compagnie Agricole du Nil . .	Antwerp	1904	Fr. 6,000,000	Fr. 620,500
Union Foncière d'Egypte ..	Alexandria	1905	£ 500,000	—
Soc. Egypt. d'Entreprises Urbaines und Rurales ..	"	1905	£ 347,000	—
Egyptian Improvements Corporation . . . . .	Cairo	1905	£ 200,000	—
Egyptian Land and General Trust . . . . .	London & Cairo	1905	£ 200,000	—
Anglo-Egyptian Land Allotment Co. . . . .	Cairo	1905	£ 300,000	—
The Garbieh Land Company	"	1905	£E. 400,000	Fr. 3,000,000
Soc. Foncière du Domaine de Cheikh Fadl . . . . .	"	1905	Fr. 15,000,000	—
United Egyptian Land Co., Ltd. und reduced . . . . .	London	1906	£ 737,900	—
Anglo-Belgian Company of Egypt . . . . .	"	1906	£ 345,690	—
The Sidi Salem Company of Egypt . . . . .	Alexandria	1906	£ 329,000	—
Sudan Land & Commercial Co. . . . .	{ Khartum and Alexandria }	1907	£ 121,875	—
Egyptische Frucht- und Waldfarmen - Gesellschaft Arno Werther & Co., A. G.	Cairo	1910	£E. 500,000	—

Not half of all the above companies were able to pay in the last year a dividend, and their shares therefore stand mostly below par, some very much lower, and especially is this the case with the companies established from 1904 to 1907, during the boom.

The States Domains, or "Dairahs," were pledged, in 1878, from the lands belonging to the Khedive and his family to the European capitalists on account of several loans; formerly these lands consisted of almost one-fifth of the whole of the agricultural land. Since the British occupation through the gradual sale of Dairah land the area has been considerably reduced; in 1907 these lands consisted of 145,540 feddans, with an official value of £E3,157,000, which, in 1912, were free from debts and represented in round figures 5 million pounds sterling. The Director-General of the States Domains is an Englishman, Birch Pasha, who has rendered great services to Egypt. The total population on the States Domains is, in round figures, 27,000, and the profits of the Domains (which acts also to private farms as a model estate) has doubled itself, owing to improved methods of cultivation, from 1889 to 1897, and from 1900 the estate yielded a surplus unknown up to that time. During the year 1909 the Domains farmed directly only 29,000 feddans of land, the remainder of their property, which is scattered all over the country, was leased or was lying fallow on account of lack of labour, and for other reasons.

The land is mostly leased to contractors who guarantee the payment of the taxes, and they re-let the land in small plots to natives; a small portion of the land only is let by the Government direct to the natives. There is a feudal tenure system, and each labourer receives from the Government 1 to 3 feddans of land on which is a dwelling place, and the tenants are free from military service. The annual rent for one feddan of land belonging to the States Domain rose on an average from 80 piastres in 1898 to 105 piastres in 1902, and in 1908 114,000 feddans of Domain land produced a rental of £E200,000, or 176 piastres per feddan. In 1910, 2,000 feddans in the Santa district were let at £E10. Cotton and wheat are the chief crops.

The public auction sales of Domain lands, in the years from 1905 to 1909, at which preference was always given to the small farmers, showed that 6,572 feddans have been sold, and that a gradual increase in the value took place. In 1905 this average was £E39, and in 1909 £E79.

The present Khedive is still one of the largest landowners in Egypt; he has reclaimed thousands of feddans of land on the coast, east and west of Alexandria, and is cultivating them.

The finest model farm in the whole country is German; it belongs to the testators of Beyerle's Estate, and is at present under the management of Herr Pelizäus, of Cairo; the area of the farm is 1,200 feddans, and it is situated at Kafsr Danouhia, near Zagazig. During several decades, under the management of a Syrian agricultural expert, a farm has been created, where not only all the modern achievements of science in agriculture have been brought into use, but also efforts have been made with a view to creating a pleasing landscape, which is a point that is almost always overlooked in Egypt; the farm buildings have a pleasing appearance. This property figures in the books with a value of £E100,000, which is

certainly too low, and earns 8 per cent. per annum. Excellent cotton is being grown on the Estate, and the first Assili cotton was raised there.

*Selling of Government Land.*—Among the lands belonging to the State there are still enormous tracts of land which are at present unfit for cultivation, but after the installation of irrigation and drainage systems it will be possible to wash out the salt and make cultivation profitable. For this purpose large capital is required, which can only be brought up by land companies and wealthy private individuals, who, as already stated, sell the land in small plots to the natives after having prepared it ready for cultivation.

The Government has taken up so far a somewhat reserved attitude in the sale of fallow land, and their intention of maintaining the small holder and of increasing their number is everywhere traceable. It is for this reason that the Government grants all reasonable facilities to attract European capital for the opening up of agriculture, but they oppose everything that might lead to a displacement of the native small holders by Europeans. Land speculation is not supported.

As already mentioned, there are in the northern part of the Delta still large uncultivated and sparsely populated tracts of land, which is salty, sandy, or swampy, and up to now is only used as pasture; parts of these tracts are covered by shallow salt lakes, but all this land can be made cultivable with proper irrigation and drainage works; it is true the land might produce during the first 5 or 6 years only rice, clover, cereals, beans, and such like, before it could be planted with cotton. The Government began a close study of this problem in 1910, and started on  $1\frac{1}{2}$  million feddans, or excluding the shallow shore lakes between the Delta and the sea, 950,000 feddans so far uncultivated, of which 600,000 feddans is Government land, and 350,000 feddans belong to the States Domains and private individuals. As far back as 1905 the Government decided not to sell this much coveted land unless a new and ample supply of water could be obtained. When this condition shall really have been reached the stipulation will be placed on the sale of the land that the buyer must really improve this fallow land, within a given time, and take care then when re-selling the land the small holders will have the full advantage of the irrigation and drainage. Pure land speculation will certainly not be allowed.

*Land Prices.*—The value of land in Egypt has had many large fluctuations in the course of time. Up to the time of the termination of the Arabi rebellion in 1882 the political situation of the country was too uncertain to give absolute protection to the landed proprietor, and this is the fundamental condition for a regular increase in land values. During the eighties the value rose first gradually, then more rapidly in the nineties, and then reached its highest point in leaps and bounds in the boom period between 1903 and 1906. In 1907 the official price for basin land was £E60 and £E120 to £E150 for perennially irrigated land, and the corresponding rent was £E5 to £E10 per feddan.

Meanwhile, the finance crisis of 1907 came, the results of which are even now felt, although it hardly brought a decrease in the price

of agricultural land; nevertheless no large sales of lands have since taken place. Naturally the prices of land vary very much in the different provinces.

One feddan of fallow land is sold at present by the State, to whom all desert land belongs, for 5 piastres, which is equal to one mark, whilst in well-situated districts such land fetches £1 and more. If the land is free from salt, and suitable for any crop, then £70 per feddan would be considered cheap, and this sum is paid willingly even in Upper Egypt. Good land cannot be obtained for less than £120 to £150, and first-class cotton land is to-day worth £200 per feddan = £500 per hectare; with good farming methods it shows a return of 6 to 8 per cent. on the capital expenditure. Even poor land is a welcome object for speculation, as it can be bought for a small sum, and after reclaiming and installing perennial irrigation its value can, in a few years, be multiplied.

The following table may be of some interest :—

Year.	Value per feddan of good cultur- able land, in £E.	
1882 .....	15	Rebellion of Arabi, emigration of foreigners and of foreign capital.
1883 .....	20	
1884 .....	25	} English occupation ; renewed confidence, but cholera.
1885 .....	30	
1890 .....	50	} Low price for agricultural products.
1895 .....	60	
1900 .....	80	} Recovery of cotton prices ; extension of mortgage credit.
1901 .....	90	
1902 .....	100	} Finish of the Assuan Dam.
1903 .....	110	
1904 .....	120	} French-English agreement, general upward tendency, boom.
1905 .....	140	
1906 .....	180/200	
1907 .....	160	Money crisis in America and Europe, limited credit in Egypt.
1908 .....	140	
1909 .....	140	
1910 .....	150	} Consequences of the crisis.
1911 .....	150	
1912 .....	150	

During the first months of the year 1912 trustees of large Arabic estates have bought land for about £E500,000, and paid the price of £150 to £160 per feddan of good agricultural land. It follows, therefore, that the price for good land, except for the boom prices of 1906, has not decreased at all, but has maintained its highest position, in spite of the continued consequences of the crisis of 1907. But the price of town building land has considerably decreased since the crisis.

*Leasing.*—The landowners let their land either for the growing of one special crop, such as clover, maize, and so on, or for 1 to 3 years. The intelligent landowner insists on a 2 or 3 years' rotation of crop, but in that case he must content himself with a smaller rent than when he allows the soil to be exhausted year after year by

cotton. At the beginning of the nineties a yearly rent of 100 piastres was paid in Upper Egypt, in the Delta 140 to 150 piastres, for sugar cane land 350 to 450 piastres. At the present day the rent for first-class cotton soil has advanced to £10, £12, and even £15 and £20, prices which can hardly go further upwards; inferior soil is let in proportion, and the average rent can be taken to be about £6 to £8 in Upper Egypt, and about £8 to £10 in Lower Egypt for one feddan of cotton land.

As in Egypt every large land holder wishes to let his land, if possible, with a certain guarantee for the rent, which the small peasant can hardly ever give, there has come into existence an intermediary, the large contract tenant, who is in a position to give securities in the form of mortgages and such like. Usually it is the Omdeh or a Sheich, the chief of the village, who leases a few thousand feddans, and sublets them in lots of 15 to 100 feddans; for good land he pays perhaps £E5 or £E6, and receives £E7 or £E8 per feddan. His next guarantor of the tenancy is a generally wealthy fellah with his own small holding, and he sub-lets the land again in still smaller lots to members of his family, or to smaller fellaheen.

*Wages and Work.*—The dependence of the Egyptian agriculture upon small holdings is evident again from the various ways in which the workers are paid. They seldom work for a daily wage; mostly all kinds of agreements are made, and these often obliterate the distinction between the labourer and the tenant. Besides the work for a share there are all possible intermediate stages. The Egyptian country population belongs to the most frugal classes of men in the world, and in accordance with the command of the Koran most of them are sober. Their requirements as to mode of living, food, and clothing are extremely simple, and therefore their daily money wage is very small. For 10 to 12 hours work—from sunrise to sunset—adults are paid, without food, P.T.2 to P.T.3 in Upper Egypt; in Lower Egypt P.T.3 to P.T.4½; for children in Upper Egypt P.T.1 to P.T.1½, and Lower Egypt P.T.2 to P.T.2½. At the time of cotton picking, during which all workers are in great demand, or when other urgent work requires doing, the daily wage rises as much as 5 P.T. The present still existing difference of wages of 1 P.T. in favour of Upper Egypt is disappearing more and more, as since the extension of agriculture in Upper Egypt through perennial irrigation, the supply of labour there does not meet the demand. Besides daily and monthly wages (the latter for the overseer), “piecework” is also known, for example, for the preparation of one feddan 20 P.T., and for the watering about 15 P.T. are paid. At the beginning of the present century the daily wage for an ordinary farm labourer in Central Egypt had risen from 3 P.T. to 5 P.T., since then they have changed little in the country, although the wages in the town have for the most part increased. In the factories 3 P.T. are paid as daily wage for easy work, and 5 P.T. to 10 P.T. for hard work.

Some estates pay ready cash for wages and add, under certain conditions, produce, besides one feddan for clover to every head of a family. Others pay their wages monthly in hard cash, about 150 P.T. Others again pay their labourers 30 P.T. monthly, but

allow them 2 to  $2\frac{1}{2}$  feddans of fairly good land, and for each child  $\frac{1}{2}$  feddan extra; such land, for which the farmer has only to pay a small rental equivalent to the land tax, must be cultivated in accordance with instructions from the owner. Others, finally, have introduced the system of dividing the yield, as the fellahs generally prefer produce to money wages. In this way labourers engaged on a cotton plantation where the soil is bad receive about one-third to one-half of the crop; where the soil is good only one-fifth. The cotton stems are used as fuel, and belong to the labourers. States Domains, as well as on the private Domains, are evidently anxious to improve the conditions of their labourers, and, for instance, the old neglected huts of the labourers are being replaced by new and better habitations. The expenses incurred through the building of these labourers' houses has been a good investment, as improved dwellings mean lower wages; a fellah is satisfied with a wage of 2 P.T. instead of  $2\frac{1}{2}$  P.T. or 3 P.T. per day, if he is well housed.

A direct lack of labour occurs only seldom, and then only at such times when Government works are being carried out, as, for instance, canal building and cleaning, &c.

*Taxes.*—The arable land is subject to a ground tax which from 1895 to 1907 was re-assessed, hand in hand with the survey of the country, and is exactly in accordance with the conditions of the cultivations; as already stated, it is about 30 per cent. of the average rent, and this is to be fixed again in 30 years. All regularly watered land has to pay this land tax; unirrigated land does not pay any tax. The rate of taxation for one feddan fluctuates between 2 P.T. and 164 P.T., 2 P.T. are paid for desert land, bought for reclamation purposes, and 164 P.T. for the best Delta soil. On an average one must calculate for cotton land in Upper Egypt 20 P.T. to 100 P.T.; in the Delta 50 P.T. to 164 P.T. The State levies now only this land tax, and has abolished entirely the old and unjust "Ushari" and "Karadschi" taxes. It is only five years after the assessment that the land tax has been levied, and in 1912 the last of the 14 provinces of Egypt adopted it. Local taxation does not exist, except in a very few towns.

#### LAND CREDIT.

A very difficult problem for the small man was formerly the lack of land credit institutions. It is true, as far back as 1880, mortgage banks, such as the "Credit foncier égyptien," and the English "Land and Mortgage Company of Egypt," were in existence. The former was principally worked with French capital and possessed from the beginning an unlimited right for the issue of bonds, and both reduced, at the beginning of the last century, the minimum amount of a loan to £100, which, however, was still far too high for the ordinary Egyptian peasant. For these reasons the fellahs were compelled to have recourse to the village usurer, generally a Greek, who, unless the year was an exceptionally good one, caused them to become bankrupt. In order to protect the fellahs from these usurious exploitations, and to preserve many homesteads from ruin, after experiments undertaken by the Government in 1895, the National Bank of Egypt (founded in 1898) was ordered to advance to the fellahs smaller sums at 10 per cent. per

annum, and these loans were transferred to the Agricultural Bank of Egypt that was established on July 1st, 1902, with a capital of £E2,500,000. The fellah now had to pay only 9 per cent, instead of 10 per cent. interest per annum, and the loans were up to 50 per cent. of the value of the property. The advances are divided into two kinds, namely, small advances or "A" loans not exceeding £E20, against ordinary receipt, and repayable within 15 months in one sum; secondly, larger advances, or "B" loans, not exceeding £E500, guaranteed by first-class mortgage on the land, at least double its value; such loans were repayable by instalments within, at the most,  $20\frac{1}{2}$  years. The interest upon this kind of loan was reduced, on January 1st, 1907, from 9 to 8 per cent. per annum.

The advances are partly used for buying land, and for the purchase of agricultural implements, and cattle, partly for the holding back of the cotton crops with the object of obtaining a better price, partly also for the repayment of old debts and other unproductive purposes, even for luxuries. The Egyptian peasant in the main does not know how to calculate.

As long as the tendency of the land prices was upward, all went well, but the financial crisis of 1907, the low cotton prices of 1908, and the poor crop of 1909, rendered the situation of the borrowers very unfavourable, and at the end of January, 1911, the Agricultural Bank had in its books more than £E500,000, divided between 49,000 borrowers, overdue. Consequently the loans were more carefully given out, and a more reserved policy was introduced. Already, in 1910, the Bank had tried to obtain from the Government cheaper and shorter proceedings of expropriation, as the Egyptian peasant must not be made to take credit too easily.

With a view to increasing and strengthening the position of the small land holders, the Egyptian Government guarantees the entire capital lent by the Agricultural Bank against payment of 3 per cent. per annum; the bonds issued since April, 1906, are guaranteed at  $3\frac{1}{2}$  per cent. The Government collects the interest and the instalments for repayment of the advance through its representatives along with the land taxes, and the Seraf or tax-collector receives  $\frac{1}{2}$  per cent. for this work. The bank has only to pay the general expenses and perform the work at the head office. In July, 1912, the total sum of the "A" loans amounted to £E102,000, and those of the "B" loans to £E7,108,000.

In the year 1905 the *Land Bank of Egypt* was established in Alexandria with a capital of £E1,000,000. It is authorised to issue bonds five times the amount of its share capital.

In 1908 followed the establishment of the *Mortgage Company of Egypt*, which was allowed to issue three times the amount of its capital in bonds; it makes advances on land up to 60 per cent. of the value.

On the basis of a concession granted in 1911 to the German Orient Bank, a mortgage bank with German capital was called into being, its style is the "*Egyptische Hypothekenbank*"; it has a capital of £E500,000, and is authorised to issue ten times the amount of its capital in bonds, whilst generally in Egypt limited

companies are not allowed to issue more than the amount of share capital in debentures; even the Land Bank of Egypt has a concession for only five times its capital. The loans of this German bank will also, by preference, be on land, as an estimate of all mortgages shows that about three-quarters of the whole of the mortgages in Egypt are on cultivated land—not building sites—and only one-quarter on house property in towns. The "Egyptische Hypothekenbank" has on its board a gentleman who is one of the best land experts in the country.

In the Egyptian law courts a mortgage book is carefully kept.

#### LIST OF MORTGAGE AND LAND BANKS ESTABLISHED IN EGYPT.

	Seat of Head Office.	Found-ed in	Share capital.	Bonds.	Last divi-dend.
Crédit foncier égyptien....	Cairo	1880	200 Mill. Frs. paid in 100 Mill. Frs.	694 Mill. Frs.	10 $\frac{2}{5}$
The Land and Mortgage Company of Egypt ....	London and Alexandria	1880	£900,000 paid in £150,000	£390,000	10
Agricultural Bank of Egypt	Cairo	1902	£3,740,000	£6,570,000	6 $\frac{1}{4}$
Caisse hypothécaire d'Egypte.....	Antwerp and Cairo	1903	10 Mill. Frs.	50 Mill. Frs.	6 $\frac{1}{4}$
Land Bank of Egypt ....	Alexandria	1905	£1,000,000	85 Mill. Frs.	9 $\frac{1}{2}$
Mortgage Company of Egypt .....	London and Cairo	1908	£2,000,000	£1 $\frac{3}{4}$ Mill.	6
Crédit foncier d'Orient, operates in conjunction with the Caisse hypothé- caire d'Egypte .....	Paris and Cairo	1910	10 Mill. Frs.	25 Mill. Frs.	
Banque hypothécaire fran- co-égyptienne.....	Paris and Cairo	1910	50 Mill. Frs.		
Egyptische Hypotheken- bank .....	Cairo and Berlin	1911	£E.500,000		

The "Credit foncier égyptien," which is worked largely with French money, has, besides an issue of 3 per cent. premium lots, debentures at 3, 3 $\frac{1}{2}$ , and 4 per cent., the Land and Mortgage Company has debentures at 4, 4 $\frac{1}{2}$ , and 5 per cent., the Agricultural Bank has preference shares at 4 per cent. and debentures at 3 $\frac{1}{2}$  per cent.

Through the competition of the Agricultural Bank the other mortgage banks have been compelled to charge even less than 8 per cent. interest, and they debit, according to the amount and period of the loan, 6 to 8 per cent. The "Credit foncier," whose money costs 4 $\frac{1}{2}$  per cent. net, charges, generally, 6 per cent., the "Egyptische Hypothekenbank," which up to now has not been able to issue debentures, 6 $\frac{1}{2}$  to 7 $\frac{1}{2}$  per cent. per annum. Still cheaper are loans advanced by the English insurance companies, which, during the latter years, have invested part of their reserve funds in this way, at 5 $\frac{1}{2}$  to 6 per cent., but quite recently they seem to be withdrawing their money again. When selling land payable at fixed periods, the

sellers usually charge  $4\frac{1}{2}$  to  $5\frac{1}{2}$  per cent., the last one-fifth, which often remains standing, has to pay 6 to 7 per cent.

The paying of interests that are due, is spread often over three years, and payment is made only after a strong request. The "Egyptische Hypothekenbank" is introducing with success a system of prompt payment of interest; one month before due date each customer's attention is drawn by a letter to their responsibilities and to the precise paragraphs on the contract, and in case of the non-payment the land is at once sold by public auction.

As a small holder of 5 feddans is not in the position, as we shall see later on, to pay interest at 7 to 9 per cent. over and above his living expenses, if he has to pledge his whole land, one can only grant him a loan up to 20 to 30 per cent. of a low valuation of his property. If the advanced money is really used for buying land or for the improvement of the soil, and not as is the case with about 25 per cent., for other things, the small holder can, if he is industrious and if the soil is good, spare from his income the interest on the mortgage. But the mortgage banks do their business almost exclusively with the large and middle-class holders, who have by far a greater balance left over and above the expenses.

In order to urge upon the farming classes the method of thrift, the system of savings banks has been extended to the villages, in 1911, in such a way that the tax-collectors accept deposits from one piastre upwards, and pay out similar amounts. Cases have occurred which are not only comical, but also characteristic of the perception of fellahs. In order to follow what they thought was a Government Ordinance, the fellahs went to their village usurers in order to borrow small sums at 20 per cent. per annum, and put these "savings" into the new savings bank at 6 per cent. per annum.

One has still to reckon also with the old prejudice, that to lend money for interest is against the laws of Moslem.

The Egyptian Government has quite recently (in 1912) issued a law for the protection of the small holder from the immoderate usurers, according to which every landowner possessing less than 5 feddans cannot be sold up. It is true this law has met with strong opposition from many quarters, and as the opinion is held that the peasant will suffer more harm than benefit by it, the proposal has been made to enforce this law only gradually in such a manner that every 5 years one feddan of land shall not be distrained upon, in order to enable the Egyptian peasant and the advancer of money to make the necessary financial arrangements in the course of the next 25 years. Otherwise the small peasant who is, as a rule, heavily in debt, would find himself immediately without any of the credit which he enjoys at present through the mortgage on his land. The Agricultural Bank, too, which one might also say is a Government undertaking, has respectfully pointed out that the proposed law is in direct contradiction to the aims and purposes set down at its foundation. In spite of all this, the "Law of 5 Feddans" will probably come into force in 1913, slightly altered.

Very important would be the establishment of agricultural co-operative banks. In 1908, already two Egyptians, namely, Boghas Pasha Nubar and Omar Bey Lufti (died in 1911) tried to

create in Egypt agricultural and urban banks, for which the example of the German Raiffeisen-Societies or the Italian co-operative banks had been selected. Whilst a bill for the country population was being drafted, but not further proceeded with, the urban population have established, in 1910, first for the benefit of the native merchants in Cairo, the "Société égyptienne co-opérative commerciale de Crédit," which, however, does not enjoy a bright existence. The idea of creating Agricultural Syndicates, which would come to the help of the planters and assist them financially, has latterly taken good hold. Lord Kitchener and the Egyptian Government have caused the State Agricultural Bank of Egypt to give support to this new enterprise, and thus a further suspension of the idea will be prevented. The Khédivial Agricultural Society is also taking a keen interest in the organisation of agricultural credit societies, and in 1912 caused a thorough investigation of the subject to be made by the French specialist, M. J. Ribet.

#### GEOGRAPHICAL DISTRIBUTION OF COTTON IN THE NILE LAND.

On a journey up the Nile, from the Mediterranean to the source, up to the lakes of its source, in the heart of Africa, one comes across cotton almost everywhere, be it cultivated or in a wild state.

The whole of the Delta district, north of Cairo and the Nile valley, north of Beni Suef, produces the very best kinds as summer crops. It is this district that has in summer an almost even temperature, the slight changes being steadied by the breezes from the sea. For the growing of the finest kind of cotton this is the climate par excellence throughout the world. In these six provinces of Lower Egypt the area planted with cotton is as follows:—

Year	Gharbieh	Behera	Dakahlieh	Scharkieh	Menufieh	Galiubieh
1907	403	263	241	199	120	60
1911	428	246	266	216	127	65
1912	433	243	261	218	126	65

Thousands of Feddans.

In Central Egypt, the district south of the Delta, up to Assiut, cottons are planted which are only slightly behind those of the productions of the Delta, as regards quality and length of staple. The provinces of Central Egypt growing cotton are the following:—

Year	Giseh	Fayum	Beni Suef	Minieh	Assiut.
1907	17	85	67	116	25
1911	43	73	79	119	43
1912	45	80	76	120	47

Thousands of Feddans.

In Fayum, too, there are, just as in the Delta, large tracts of salty lands which were formerly cultivated, and these are being gradually reclaimed again for cultivation.

Further south, between Assiut and Assuan, is Upper Egypt, and here the alluvial soil is less fertile and less extended, the summer is considerably hotter, and the kinds of cotton which are cultivated here are somewhat lower in quality, and must be as carefully selected as the time at which the sowing has to take place. The three provinces of Upper Egypt had the following area under cotton cultivation :—

Year	Girgeh	Keneh	Assuan
1907.....	90	1,300	110
1911.....	1,750	3,930	770
1912.....	2,750	3,580	340

Feddans.

In Central and Upper Egypt, just as in the Delta, an extension of the cotton cultivation will go hand in hand with the enlargement of the modern irrigation works, and already 25 per cent. of the culturable land in Egypt are under cotton cultivation; those soils which are able to grow cotton are planted every year to the extent of a third or half with cotton.

Formerly, the agricultural motto was : Lower Egypt for cotton, Upper Egypt for sugar cane, but latterly the cotton plant is penetrating year by year successfully more into the south, and in the provinces of Giseh, Fayum, Beni Suef, and Minieh, the cotton area is increasing annually.

In proportion to the whole area, the development of cotton has progressed in the last few years as follows :—

Year	Delta.	Upper Egypt	Total Feddans
1909 .....	1,826,588	270,467	1,597,055
1910 .....	1,825,834	316,776	1,642,610
1911 .....	1,847,522	363,705	1,711,272
1912 .....	1,846,263	375,561	1,721,797

Still further south of Assuan, in Nubia which lies in the hot regions between the first and second cataract, and the administration of which still belongs to Egypt, the Nile Valley is considerably narrower than in Upper Egypt, and the cultivable land reaches seldom further inward than a couple of hundred metres from the river; frequently it is only a few yards wide, and often rocks and sandy desert come right up to the Nile. Only inferior kinds of cotton grow here in summer and in winter, but the better kinds can only be cultivated in summer, and the sowing must be undertaken towards the end of May to the middle of June.

The further one goes towards the south, into the Sudan, the more important are the changes of the climate for cotton cultivation. In the district north of the city of Khartoum the winter is still too cold for the cultivation of superior kinds of cotton, but as soon as we go southward we get into districts where the summer is no hotter than the north of Khartoum, but the winter is considerably warmer than

there. Superior kinds of cotton can be grown here as summer, autumn, and winter crops.

Still further southward, in the district of Gondókoro on the White Nile, the climate is exactly the contrary to that of Europe and Egypt. January is the hottest month of the year, and at the same time the driest, and therefore the most favourable time for the picking of cotton. South of Gondókoro regular irrigation ceases. On the banks of the Nile one may indeed meet with small cotton plantations, for instance, near Nimule and Masindi, but on the whole the cultivation is of no importance here, and the result of the crops depends entirely upon the amount of rainfall.

#### THE EGYPTIAN KINDS OF COTTON.

Egyptian cotton, in Arabic called "El Kotn," comprises, to-day, over 100 varieties, and these show, perhaps, botanically, considerable conformity, but the opinions differ widely to which species and origin the original kind or kinds must be attributed, and as to how far the imported American kinds, sent to Egypt in the 19th century, affected the kinds in existence at that time in Egypt and the Sudan. The botanical history of the Egyptian cotton is not at all clear; exact ancient accounts are rare, and the existing pressed plants in herbariums are, until relatively recent times, so few and incomplete that not even the exact nature of the original "Jumel" cotton of 1820 can be traced by it. As far as one can form an idea from the reports beginning with the 16th century, cotton of the Asiatic type (*G. herbaceum* and *nanking*) was grown as an annual and as a perennial. Already in 1640 a perennial cotton of a similar type to the peruvian *G. vitifolium*, with a rough brown fibre was grown. The descriptions existing from those times might also have reference to "Hindi." The description of the French expedition given in 1800 does not enlighten us as to the three different kinds of cotton found in Egypt. The "Jumel" cotton, whose lint is brown, long, and strong, and whose fibres are easily removed from the naked seed, was probably a *G. vitifolium*, and through its hybridisation with the Sea Island and Brazilian cotton, introduced in the first half of the 19th century, the present species have arisen. The introduction of Sea Island cotton into Egypt lasted from 1822 to 1860, or even later, that of the Brazilian seed from 1827, or 1828, to 1865. Doubtless, there is a near relationship between most of the Egyptian kinds and *Gossypium barbadense*, the original Sea Island cotton; some, especially several of the white Egyptian kinds, are attributed to *Gossypium peruvianum*; *Gossypium herbaceum* and *hirsutum* are also represented, and in Senaar and in the Upper Nile district the red flowering *Gossypium arboreum* is found in a wild state.

Local differences of the growing conditions and numerous crossings between indigenous, Asiatic, Sea Island, Brazilian, and Peruvian species have given quite a number of valuable varieties, which all possess distinctive advantages as regards fineness, length of staple, gloss strength, and excellent spinning qualities of the fibre. But of the several kinds which have gradually been formed in Egypt

only few have lasted, and they are varieties which came into existence without the assistance of human skill. Man has done nothing else but grown them separately in the fields.

Most of the varieties are called after the name of their discoverer, breeder, or after the place where they were first found.

The chief commercial varieties within the last century, beginning with those descended from the original Mako/Jumel cotton, were the following brownish types :—

*Aschmouni*, or Upper Egyptian, called after the place Aschmoun, in the province of Menufieh in Lower Egypt, where it was detected; it supplied from 1863 to 1892 the major quantity of all the Egyptian cotton crop. Its colour is light brown, its staple length 29 to 32 mm., ginning outturn about 30 to 32 per cent. of lint, its seed particularly smooth, very rich in oil. Gradually new sorts came up, especially in the Delta, which had a longer, finer, and more silky staple, and gave larger yields. *Aschmouni* is the oldest kind still in cultivation, but at present it is restricted almost entirely to Upper Egypt and Fayoum, where, in 1911, with 93 per cent. of the cotton cultivation, it is almost exclusively grown, as the soil and the dryness of the air there are particularly suitable for it. In commerce it goes bluntly under the name of "Upper Egyptian." Of all Egyptian varieties it still supplies to-day the second largest crop.

*Bamiah*, or "Bamieh," so-called on account of its similarity with the habits of the *Hibiscus esculentus* (Arabian *Bamiah*), of which it is perhaps a hybrid (?), had formed itself spontaneously in 1876, at Birket-el-Sab in Lower Egypt, and was cultivated there in large quantities from 1878 to 1898. It is a plant up to 3 metres high, of coarse growth, which, however, is less hardy than *Mitafifi*, and ripens later; its light brown fibre in comparison with *Mitafifi* is quite as long, but not as fine, and less resisting. For this reason its cultivation, after a lengthy time, decreased steadily, and to-day it is not grown at all; people also gave it up, because its sturdy growth required plenty of waterings. Its ginning outturn was 32 to 34 per cent.

The largest portion of to-day's Egyptian cotton crop is made up by *Mitafifi*, so-called after the village Mit Afif in the province of Menufieh, where a Greek merchant first discovered it in the season of 1882/83; he became accidentally interested in the seed of this plant through the bluish-green downy spot on the seed tips, and after planting this seed he found that this new kind had many advantages over the old *Ashmouni* from which it had descended. It is more resisting and hardy, ripens unusually early, its colour is darker and richer than the *Ashmouni*, and is the darkest of the chief varieties, its staple length varies between 29 and 38 mm.; on an average it is 34 mm. The fibre is fine, silky, and very strong; the yield, in spite of early ripening the largest, even on average soil being 560 to 670 kg. of lint per hectare. At the same time the lint is easily picked and ginned, and the difference in the qualities between the first, second, and third pickings is generally less marked than with other Egyptian species. At first the ginning outturn was per 315lbs. of seed cotton 115lbs. of lint, a very high rate, which, after gradual degeneration, went down to 103lbs. *Mitafifi* is almost

entirely confined to Lower Egypt; it does not thrive everywhere in Upper Egypt, and for this reason is hardly cultivated there. It may be said that Mitafifi, which has been cultivated on large areas since 1887, has been the predominating variety of the Egyptian market since the early ninetieth, and the price of "Mitafifi fully good fair" is generally taken as the basis for quotations in the valuation of Egyptian cottons; even in 1910 still two-thirds of the cotton area was planted with Mitafifi; in Lower Egypt as much as 90 per cent.

Mitafifi begins to decline rapidly, is to be had pure only on the States Domains, but on all other plantations is becoming inferior in length, fineness, hardiness, and yield, and lighter in colour, and at the same time shows an increasing admixture of "Hindi" cotton, so it will be necessary to grow in larger quantities the four new varieties, for which higher prices are paid, the following two of these are of a brownish tint: *Nubari*, called after Boghos Nubar Pasha, one of the largest Egyptian landowners; it is being cultivated in the Delta since 1903, gives a good brownish fibre, whose value stands between that of Mitafifi and Joanovitch; in comparison with the Mitafifi it is just as hardy, the lint is easily picked, its staple is longer; the plant matures earlier and yields better, consequently it seems well-suited to replace Mitafifi. Its length of staple is 36 to 40 mm., ginning percentage 32 to 33 per cent. It is a pity that the quality of Nubari has already likewise begun to deteriorate.

A great future seems to be open to the new kind of *Assili*, discovered in a field of Mitafifi cotton by the Greek Parachimonas, as a natural hybrid, which was conspicuous by its larger capsule and excellent lustre of the fibre. The Alexandrian firm of J. Planta & Co. undertook the supervision and the careful rearing of this variety through reliable planters, the seed was sold only under the condition, that all the cotton raised had to be sold to it, and in this careful way it established the variety, and already in 1910 important quantities of it came on the market, in the season of 1911/12; some 5,000 bales could be delivered.

"*Assili*" is similar to the Nubari, but of a somewhat lighter brown, its length, fineness, strength, gloss, and evenness of fibre are very good indeed, it has a length of staple of 34 to 38 mm., a ginning yield of 34 to 36 per cent. of fibre, and on average soil it produces 3 to 5, on good soil 5 to 8 kantars of lint per feddan, and often more.

The British Cotton Growing Association had presented a silver cup at the Agricultural Exhibition at Cairo, in 1912, for that kind of cotton, which came next to the old Mitafifi, before its degeneration. This prize was awarded by the judges to *Assili*, which thus has been officially proclaimed as successor of the Mitafifi, and as in a few years as much seed of *Assili* can be had as will suffice to replace Mitafifi entirely, it is quite possible that this may happen. The Arabic word *Assil* means "Original," and it is intended to convey the idea, that a regeneration of the old original Mitafifi has taken place. For this reason it is also called "*Assil-Afifi*." So far the development of "*Assili*" has certainly not quite fulfilled the high expectations that were anticipated. Spinners complain particularly about irregularity in length of staple. Besides

these brownish types are a number of golden yellow or butter-colour varieties :—

The *Hamouli*, called after the place Hamoul, in the province of Menufieh; on account of its pale yellow-white, it is sometimes called "Sukari," i.e., sugar, which is of a similar shade; it has a short, but a very fine and very strong staple, and gives 35 per cent. of lint. In spite of the fact that it gives a good yield and is very early, it belongs to those numerous kinds which have been neglected, and have almost disappeared. It is not liked on account of its pale colour and short staple.

Highly valued are two new yellowish kinds, viz :—

*Joanovitch*, called after the Albanian who discovered it in 1892, at Fagalla, near Cairo, among Mitafifi. It is being cultivated since 1897, its ginning outturn is only 31 to 32 per cent. on account of its large seed, which is 8 to 10 per cent. less than for Mitafifi; its staple has a length of 36 to 42 mm., is long, fine, strong, and very glossy, and for this reason is always sold at a good price. This has been the cause for its increased cultivation, although Joanovitch requires a very good preparation of soil, attention during the growing period, and also very careful picking, as the bolls are very liable to shed. According to areas cultivated Joanovitch comes third, after Mitafifi and Ashmouni.

Still more beautiful and more valuable is the still lighter yellowish kind,

*Sakellaridis*. Its name has been taken from its Greek discoverer; it is being cultivated since 1906, and is an early ripening kind which gives, however, only 30 to 31 per cent. of fibre, but in certain fields a higher yield per feddan than Mitafifi. Sakellaridis surpasses, on account of its 38 to 45 mm. length of staple, its fineness, silky appearance, and strength, all other Egyptian kinds; it is slightly higher valued than the above-mentioned Joanovitch. Its cultivation has increased quickly, and at present the area under cultivation with Sakellaridis is the fourth in importance. Even in Upper Egypt people have lately made experiments with this kind.

Much less important for Egypt, but still represented, are the white kinds, of which one variety which is *not* cultivated, must be mentioned, viz.,

*Hindi cotton*. It is not known whether it has been introduced from Persia, or India (Hind), or from America, or whether it is a degeneration of an Egyptian prototype. It is found all over Egypt, growing partly wild on uncultivated or abandoned land, partly in cotton fields between other kinds, especially between Mitafifi and Joanovitch. It is systematically weeded out as it has a length of staple of only 25 mm., no lustre, has a brittle, coarse, and irregular fibre. The plant which is appropriately called "Hindi weed," which means Indian weed, is easily recognised on account of its high growth, thicker foliage, and of its white, not yellow, flowers, and on account of its bare, black seed, which has a sharp pointed end. The young "Hindi" plants have red stripes along the stalk, and a red spot on the stipule of the stalk, and are therefore easily recognised; although these young plants may be the strongest, it is necessary to pull them up when thinning out. As Hindi cotton ripens late, the first picking contains usually very little of this admix-

ture, but a much larger percentage is found in the third picking. For this reason Hindi is more prevalent in fields that have been planted with inferior seed bought from native dealers who sell all kinds of seed, even seed from third pickings. Whilst "Hindi" cotton is not known in India by this name, it is cultivated to this day in Mesopotamia.

Among the *white* cultivated varieties the *Belledi* deserves to be mentioned. This kind, as we have stated in the historical part of this book, was the prominent variety in the first quarter of the last century, but had to make room for the more valuable Jumel cotton. *Belledi* means in Arabic "indigenous or native."

Of the later introduced varieties, of a white shade, we have the following, of which Foaden says that they have originally come from India.

*Abiad*, which means white, cultivated particularly in 1864 to 1890, with a staple length 27 to 35 mm., superseded to-day by the better Abbassi, just as

*Zaftari*, called after the place Zifta in the Delta. This had a ginning outturn of 33 to 38 per cent., but its white lint is harsh and coarse, not very strong, and only of medium length in staple, about 32 mm. The only white Egyptian kind that is really of use is

*Abbassi*, which has been cultivated since 1891/92; it was discovered by the Greek, Parachimonas, and called after Khedive "Abbas." *Abassi* is a cross of the abandoned "Zafiri" with "Mitafifi"; it is of a pure white colour, fine, silky, and has a long staple 39 to 41 mm., although it is not as strong as Mitafifi, and does not bear as well. The ginning percentage is 33 to 34 per cent. Particularly both the first pickings fetched formerly the best prices in the Egyptian market. It is not cultivated very largely, although it suffers less than other varieties from the weather, and withstands even the dry period better.

A kind of Abbassi, but not of such high yield, is *Voltos*, called after a Greek of the same name at Kafr-el-Zayat, who discovered it in 1900; it is cultivated in small quantities in the province of Garbieh and Menufieh. It is more hardy, stronger in staple, more glossy, and more creamy coloured than Abbassi, and may dislodge it more and more.

*Sultani* is a new white variety which is very similar to the Sea Island cotton; in its pure state it has a particularly long staple, but it is cultivated very little.

*Joanovitch* used to give in places, quite spontaneously, white cotton, so that besides the yellow kind we had also a white Joano-vitch; the latter is now a rare occurrence.

As originating from the genuine Sea Island, which was re-introduced about 40 years ago from South Carolina, but again abandoned on account of its small yield and slow ripening, the following kinds are considered. None of these had the clear brownish tint of the varieties originated from the "Jumel" cotton, and as they were short of other special properties which the Jumel varieties possessed, their cultivation was likewise given up.

Only one of these Sea Island types was extensively grown, viz., *Gallini*, called after the place Galline, in the province of Garbieh, where a Copt had discovered it in 1873. It

had a pale gold colour, and as its staple length was 38 mm., and could be used for spinning up to 200's, it was very valuable. Gallini was cultivated a good deal in Upper Egypt up to about 1887, but it is no more grown because it produces very little per acre, and suffers easily for lack of water, and ripens late; its fibre percentage is 27 to 28 per cent.

Zafiri was discovered by a Greek of this name; in the province of Menufieh, it was a good quality, but of a singular and irregular colour.

*Hariri* "cotton silk" was cultivated at times in the Delta, but was abandoned on account of its small ginning outturn, which was only 19 to 22 per cent. of lint.

*Psikha*, called after the name of the discoverer in Tantah, is darker than the Zafiri, but not as good in quality; it has disappeared to-day just as the former varieties.

*Maskus*, called after the same name as its discoverer, was first cultivated in 1893/94 and given up, because it ripened too slowly and yielded too small a ginning outturn.

Experiments have also been made with the perennial tree kind from Australia, the

*Caravonica* cotton, but they cannot be called successful. When grown in gardens and sheltered places, carefully looked after like a rose tree, it gave good results, but in open fields Caravonica has proved to be not hardy enough and failed entirely, as it cannot stand the wind. The fact that in the first year no cotton is obtained from it is also very much against its cultivation.

The present Egyptian varieties which enter into commercial channels are :—

					Length of staple mm.		Ginning outturn %
<i>Brown</i> :							
Upper Egyptian or Ashmouni .....					29—32	..	30—32
Mitafifi .....				{ on an average	29—38 34	..	32—34
Nubari .....					36—40	..	32—33
Assili .....					34—38	..	34—36
<i>Yellowish</i> :							
Joanovitch .....					36—42	..	31—32
Sakellaridis .....					38—45	..	30—31
<i>White</i> :							
Abbassi .....					38—40	..	33—34

The area under cotton is subdivided in the following way, as to the varieties :

Year	Mitafifi	Ashmouni	Joanovitch	Sakellaridis	Nubari	Assili	Abbassi	Diverse	Total in thousands of Feddans.
1909 .....	1053	252	199	—	63	—	24	6	1597
1910 .....	1011	293	209	—	97	—	22	10	1642
1911 .....	846	330	251	120	115	—	33	16	1711
1912 .....	692	344	239	197	159	40	36	14	1721

One may say generally that the cultivation of *all* superior kinds of cotton is limited to the Delta.

What is known in commerce as *Scarto* and *Affitti* are not descendants of a certain type of plants. These names are used to describe the downy waste, similar to the American Linter, which adheres to the seed-kernels after ginning, and has to be removed by a second process. If, after ginning, the seed is passed through another roller gin one obtains the "Scarto," if one uses instead the quicker-running saw-gin, one obtains "Affitti." The two kinds of linters are brought into commerce in three qualities, viz., secunda, prima, and extra. The inferior seed-cotton which has been injured by boll worms, or is found in stunted and dirty bolls, is also called "Scarto." Such seed-cotton is ginned separately, and is used chiefly in Egypt for stuffing cushions.

The International Cotton Congress, held in Alexandria and Cairo, in the autumn of 1912, has recommended that one should, in the first place, devote attention to the growing of a medium quality, a bread-and-butter mark, with a uniform and strong fibre of the old type of original Afifi quality, and that care should be taken not to grow too many different varieties.

For the European consumption, it was stated, at the meetings of spinners in Cairo, the following kinds are sufficient; on the basis of 6d. for middling American cotton in Liverpool, the following prices may be considered as fair:—

Sakellaridis .....	12d.
Joanovitch .....	11d
Nubari and good Afifi .....	10d.
Ashmouni .....	8½d. to 9d.
Abassi and Voltos .....	10½d.

The spinners also cautioned the planters not to extend too much the cultivation of Sakellaridis or other long-stapled kinds, as the consumption of these is limited, and that there are relatively only few mills which possess machinery adapted for them.

At the beginning of December, 1912, the prices paid per Kantar in Alexandria were as follows:—

	Dollars
Joanovitch .....	21 — 22
Sakellaridis .....	20½ — 22
Abbassi .....	20 — 20¾
Nubari .....	19 — 20
Afifi .....	18½ — 20
Ashmouni .....	15 — 16¾

#### SEED SELECTION AND BREEDING.

In spite of the excellent kinds of cotton which Egypt possesses the method of the selection of seed has up to now been very primitive, although the Domains, the Khedivial Agricultural Society, and the Agricultural Department have, during the last few years, distributed good seed at cost price.

Even Mohammed Ali had introduced the system of changing the source of the seed supply every 5 years, and it is on this principle of seed change that the poorest fellahs, even to-day, buy

seed from outsiders for the cultivation of their fields. One ardeb of seed at the price of 70 P.T. to 100 P.T. is sufficient for 4 feddans, so that for one feddan about 50 litres ( $30\frac{1}{2}$  kg.) are required. The weight of an Egyptian seed grain fluctuates from 0·06 to 0·17 grms., and may be said to be varying just as much as the height of the plants.

As very few plantations, except the States Domain, possess their own gins, and as seed merchants by trade do not exist in Egypt, the fellahs are compelled to rely upon the general ginning factories for the supply of the seed for sowing purposes; these sell the varieties asked for, without guarantee that the seed is really the kind ordered. The manner in which the seed cotton is delivered to the ginning factories from the many different fields renders it difficult to keep different lots of seed apart, especially as the seeds from the different commercial varieties of Lower Egypt do not show any distinctive marks on the outside of the seed. Some few distinctive points are known: Afifi seed has a bluish-green downy spot on its point; that of Sakellaridis is particularly downy; that of Ashmouni is nearly smooth; that of the Joanovitch is somewhat larger. But in consequence of the numerous hybrids it is often impossible even for an expert to differentiate between the various seeds. The new kinds which are constantly brought out remain pure only as long as they are under the control of the breeder.

The peasant buys his seed sometimes direct in the ginnery, but mostly through the medium of a Greek merchant.

As long as he buys the seed from large and well-conducted ginneries he would probably receive a good quality of seed, as in such factories the lots are kept carefully apart. As the owners of these ginneries are the merchants who usually buy in the subsequent year, the cotton for which they have supplied the seed, they are, of course, greatly interested in the problem.

Circumstances are quite different as regards the numerous small ginneries spread all over the country, as they look upon the sale of seed merely as a business transaction, and do not pay any heed to the quality of the seed they supply. It often happens in these factories that seeds of brown and white kinds are mixed together and are so sold and sown. Mixed seed is partially traceable to the fact that farmers do not buy sufficient seed to cover the quantity which they may require for re-sowing. When a fellah notices that his seed has not come up evenly he goes to the ginnery for a new supply, but he may find that no more seed is left from the variety originally sown; he then goes to a dealer or even into the bazaar at Alexandria. The result, of course, is a fearful mixture. The Egyptian peasant himself is often the culprit, as through his lack of commonsense he rather buys poor seed at a lower price from an unreliable dealer, although he loses through these "cheap" seed a hundredfold, owing to the inferior yield in quality and quantity of the crop.

So far as seed selection is carried on it is partly made already in the field, in this way, that about a third of the children go in advance through the field in order to pick the finest mature bolls separately, and to gather those over ripe lint that has fallen on the ground, the seed of which, as experience has shown, will germinate

quicker and produce early-ripening plants. The cotton thus gathered is ginned separately. This system is worth following, but is only practised on the Domains and by a few large landowners.

Only in rare cases is a selection of the picked seed cotton made by hand in the ginneries; the seed cotton is sorted according to colour and quality, and the different lots are separately ginned, and the resulting seed is kept apart for sowing purposes.

The large firms which enter into the question for the supply of seed, and who also sell to the Government, select the seed chiefly in the following way: From each variety the seed of the finest lots, which have come in from the first, and sometimes from the second picking, is kept back, *i.e.*, of such cotton which excels in good staple, purity of variety, high-ginning outturn. This seed passes through sorting machines which separate the light and not well-ripened seeds; it is then put into sealed sacks in which it is delivered to the planters. To distinguish the seed that is kept for sowing from that which is used for crushing, the former is called "Takkawi," and usually fetches 10 P.T. to 20 P.T. more per ardeb than the ordinary seed.

The seed obtained from cotton of the third picking is not liked for sowing purposes, but is mostly used in the oil factories; the seed of the first picking is by far the best.

The introduction of American cottonseed was prohibited by the Egyptian Government in June, 1904, in order to prevent the importation of foreign insects, and in August, 1909, this prohibition was extended to all foreign countries. In fact, it does not seem to be of any purpose to introduce foreign kinds; the aim should rather be to establish pure strains of the excellent indigenous kinds, and to improve their qualities, and in doing this, attention will have to be paid to early maturing, to good yield, and ginning outturn; the staple must be long, silky, strong, and well twisted.

How much Egyptian kinds require new blood is shown by Mr. F. Lumbroso, of Alexandria, who has observed, that always after the introduction of a new kind the increased yield rose immediately by 1 to  $1\frac{1}{2}$  kantar per feddan, and the ginning outturn by 12 to 14 per cent. This increase gradually disappears again with the degeneration of the seed, and after a more or less long period the cultivation of the respective variety must be given up and replaced by a new kind of seed. The life of a variety is stated to be about 22 years, and at present not only does Mitafifi decline, but Nubari and Joanovitch also begin to get poorer. What Lumbroso calls "deterioration" is explained by science, simply through the continual and natural hybridisation which is bound to go on when different kinds of cotton are grown in neighbouring fields, where the pollen is carried largely by bees; this hybridisation is made worse through the mixing of seed in the ginneries.

Since the establishment of the Agricultural Department the Government endeavours to prevent the further degeneration of the Mitafifi, has set up a control over the distribution of the seed for sowing purposes, and above all, it has taken steps to prevent the mixing of seeds with that from Upper Egypt.

The Agricultural Department buys for this purpose selected seed from those ginneries which are known to be well managed, and sells

it in small quantities, not over 3 ardebs, at cost price to the small planters, and the amount of the seed is encashed together with the taxes, after the fellah has had his cotton crop from the seed.

The Government has also entrusted Mr. W. Lawrence Balls, who for a number of years was the botanist of the Khedivial Agricultural Society, and has been transferred to the Agricultural Department when this was founded, with the problem of working out a system of seed breeding. A well-fitted-up laboratory, with adjoining experiment and seed fields, was erected in 1911 in Giseh, near the Agricultural and the Polytechnic Schools. Mr. Balls had already begun in 1906 to isolate really pure Egyptian cotton races according to Mendel's law of heredity. This principle, which was made public as far back as 1865, was established by the Abbot Gregory Mendel, of Bruenn, Austria (1822 to 1884), and had remained almost unnoticed until the beginning of our century. Since then it has been adopted into practice by several people, and forms to-day in Egypt the foundation of the Government system of improvement of the cotton seed. Mr. Balls carries out the breeding of pure races under cages covered with fine wire-netting, which prevent the transfer of the foreign pollen by bees. The pure races obtained from the cages, in the selection of which particular stress is laid upon the yield and early maturing properties, are to be kept separate on special seed farms, and are to be planted in those districts which have been proved favourable for them.

The larger planters, too, who up to now were provided with good seed through the Khedivial Agricultural Society, which obtained it from the States Domains and other reliable sources, are in future also to be supplied through the medium of the Agricultural Department, and the four years' course which has been decided upon by the Agricultural Department in agreement with the Domains and private planters, will be the following :—

*First year:* Supply of pure seed, bred according to Mendel's process on the experimental farms, to the States Domains.

*Second year:* Planting of the seed obtained from the States Domains by the large planters, and re-purchase of the seed thus obtained.

*Third year:* Planting of this seed on plantations of medium size, and re-purchase of the seed of the third generation thus obtained.

*Fourth year:* Sale of such seed on credit to the small peasants.

*No use to be made for sowing purposes of seed which is of this last generation.*

The sale of Government seed is carried on through the Egyptian Markets Company, and other agents, and the Government intends to give the fellahen facilities for payment of the seed.

For the sowing in 1912 the Government distributed 40,000 ardebs, about one-tenth of the total requirements of Egypt, and with a further extension of this method good results will undoubtedly follow.

Lord Kitchener has also given instructions that the recent discovery of Mr. Woldemar Schuetze in Berlin, for which a patent has been taken out, be examined. The invention claims to prevent a

degeneration of cotton, and consists chiefly in the pruning and grafting of cotton stems with young shoots from the same mother plant.

The price for seed varies, of course, very much; cotton seed suitable only for the manufacture of oil, costs, in Alexandria, about 80 P.T. to 90 P.T.; selected Mitafifi seed for sowing purposes is sold by the Government to small holders at 105 P.T. J. Planta & Co. asked for Assili seed at first 300 P.T. per ardeb, an exceptional price, which could, of course, only be obtained for the small quantities when the seed made its first appearance in the market. At the end of 1912 Assili seed was sold already at only 20 P.T. more than the seed of the other Delta varieties. The suggestion, that for the sale of cotton seed a special Government license be required, seems quite feasible.

### THE CULTIVATION OF COTTON.

*Okre and Bikre Cultivation.*—Since olden times cotton was cultivated in Egypt, where it seldom freezes, on the Okre system, which means in perennial cultivation, and after picking, about the end of November, the whole of the side branches of the cotton plant were cut off and the main stem was cut back to about 20 cm. or 60 cm. from the soil. The fields were allowed to lie fallow until the end of March, they were then watered, and shortly afterwards new shoots sprung up from the main stem. The soil was then treated in the usual way, relatively early crops were obtained, and the cost of tilling was also saved, but it was impossible to grow different crops on the same soil in the same year; at the most, a few vegetables were planted between the rows. The scientists who accompanied the expedition of Bonaparte found, at the end of the eighteenth century, cotton in Upper Egypt which had been growing for 10 years; they state that in the autumn the dry branches were broken off and the plant would shoot out again in the next spring; only during the first two or three years Bamiah (*Hibiscus esculentus*) and other vegetables were cultivated between the cotton at the same time. From then to the tenth year cotton was grown alone without a catchcrop. With the introduction of the Jumel cotton the Okre cultivation was reduced to three years, the yield of the second and third year was larger in quantity but lower in quality; the plants were therefore pulled up after the third crop.

It was only by gradual stages that the fellahs adopted the *Bikre* cultivation, which has now been almost exclusively used in Egypt for about 20 years, and is the system of sowing cotton annually. It was already in use in the Delta at the time of the expedition of Bonaparte.

The changing from the "Okre" to "Bikre" cultivation marks the third milestone in the history of Egyptian cotton cultivation. As first milestone may be considered the introduction by Mohammed Ali of rational cultivations on a large scale, and as second the increase of the culturable areas through the construction of irrigation canals, the next step will have to be the systematic manuring.

The preparation (tilling) of the soil may be carried out on the large Domains in the Delta more carefully and more intensively with steam ploughs, and undoubtedly more attention is paid there to the use of the best seed, proper time of sowing, and the frequent

loosening of the soil, than on the fields of the small fellah, but in the main the whole method of cultivation in the entire Delta is the same, and generally speaking, the industrious fellah tills his field very carefully, in spite of the use in the Delta of the most primitive implements, viz., the plough and the hand hoe, mentioned already in the Old Testament.

The best piece of land that is to be cultivated is selected for cotton; the first work is to level the surface of the field most carefully, in order that the irrigation can easily be undertaken. In this work, as well as in the ploughing, care must be taken that deep-lying strata, which are not adapted for cultivation, are not brought to the surface. Where necessary, the salt must be removed from the soil. The levelling of one feddan, including the laying out of irrigation ditches, costs about £E $2\frac{1}{2}$  to £E3.

Then follows the tilling proper; it is important that the soil be ploughed repeatedly, allowing some time in between each ploughing.

When the field has been lying fallow, it is watered by the Nile flood in August, and it requires only two ploughings then. This method is practised only by few large Domains. Maize is mostly planted in June, after the harvesting of the winter crop, and after the maize has been gathered in November the land is left for a short time either fallow or it is planted with clover, which at times is sown between the maize; in such case the soil really requires four ploughings before sowing it with cotton.

The large planter is satisfied with one cut of clover, and has therefore time to plough four or even five times, and in such a way a soil is prepared that will further the development of the cotton plants, will cause an earlier ripening, and consequently the plants will be less exposed to the injurious autumn fogs and rains. A small fellah is not content with one cut of clover, he takes two or three crops off, but this is false economy, for by doing so he delays the ploughing too long, with the effect that he can only give two ploughings before the sowing season for cotton comes in.

After the clover or wheat crop has been brought in during January the fields are ploughed in February; the peasant ploughs his field first lengthways, then after a few days crossways, in order to loosen those places which the plough on its first journey did not break up.

As the Egyptian plough has no furrow board the clods are not turned up, they are mostly broken up by hand. If the condition of the soil is still not as it ought to be, the plough is worked over it once more. The large landowner works exactly in the same way with the steam-grubber. After each ploughing the soil is mostly levelled by dragging over the land a heavy wooden beam, about 4 m. long, called the "Zahaffa." The disc roller, which is such a useful appliance for breaking up the clods, is very seldom used.

The Egyptian plough, yoked with two oxen or camels, penetrates only about 10 cm. to 12 cm. deep into the top layer of the soil, and can only plough about one-half to three-quarter feddans per day, but the soil is sufficiently loosened by ploughing it crossways to enable the roots of the young plants to penetrate even through heavy and retentive soil.

It is strongly recommended, in view of the long tap roots of the

cotton plant, to loosen also the deeper-lying earth layers of the soil to about 30 cm. depth, with a subsoil plough; but care should be taken that nothing is brought to the surface, as the deeper layers are much less weathered or loose, and are therefore less suitable for the growth of the plant than the earth nearer to the surface. Deep ploughing is practised only where one can at the same time manure thoroughly. The main point, however, is that the breaking-up and mixing-up of the upper layers to a depth of about 15 cm. is well done. The tap roots of the Egyptian cotton plant are over two metres long, its side roots reach from 10 cm. to 50 cm. below the surface.

After the field has been prepared in this manner the ridges, little dams and water channels, necessary for irrigation purposes, are made with the plough.

The ridges, which are about 4 m. to 23 m. long, are made by hand, or the "Battana" (a primitive wooden frame), or the modern plough; they run parallel, at regular distances of from 60 cm. to 100 cm. from east to west, and are about  $\frac{1}{2}$  m. high; on the usual double "Kassaba" (land measure of 3·55 m. by 7·10 m.) are, according to plough line and distance, 5 to 6, or 8 to 10 ridges. When these are made it is necessary still to throw up the small dams, which keep the water within these small plots.

Now the sowing may begin; a cold or a damp spring may easily defer the sowing for three or four weeks.

*Sowing.*—Usually the 20th March is the proper sowing time, but in the south sowing begins already in the second half of February. It is true the early seed runs the risk of getting injured by the cold nights, but on the other hand an early crop, therefore less endangered by wet and cold in autumn is guaranteed. Thus sowing extends from the middle of February to the middle of April. There are two different methods of sowing, the wet and the dry method.

In the wet method, or which is called the "Demensau," the water is allowed to run in the furrows before sowing until they are filled to about two-thirds. In eight or ten days the land is again dry, but a line has been left behind on the side of the ridges showing up to what height the water had risen. Along this line on the ridges the seeds are planted always on the south side of the ridge, which runs from east to west; this is done in order to protect the young plants from the cold north winds, and in order to give them the full advantage of the sun. The first watering after the sowing follows mostly between the 25th and 35th day. With a second wet method, called the "Meskaui," the watering is not given before but immediately after the sowing.

In the "dry" or "Baali" method, which is the one most extensively used, the fields are not watered before the sowing. With this method it is more difficult to plant all the seed at the same level, which is necessary on account of the subsequent waterings. In this method the seeds are only lightly watered in the process of planting.

The sowing is carried out by children. At a height of two-thirds of the ridge holes 5 cm. to 7½ cm. deep are made by means of a dibber, at a distance of 25 cm. to 50 cm., mostly 40 cm. to 50 cm. In each hole are placed between 7 and 15, even up to 20, seeds, which are then covered by hand with loose earth. The large number of seeds in each hole is apparently a great waste of seed, but this is

explained by reason that the easily hardened crust of the soil is frequently only broken through by the united effort of numerous shoots, and for this purpose even beans are often put in the holes together with the cotton seed. The cotton seeds, which ought to be from the last year's crop, are usually soaked in cold or lukewarm water for a day; seed from the crop from the year before last is also used with success. Some people maintain even that this older seed germinates better, a statement which can hardly refer to the Egyptian seed in general. About one-quarter of an ardeb is used on each feddan = 40 to 50 litres = 25 to 30 kg. of seed.

About 10 to 12 days after sowing the seeds sprout, and where they have not begun to show life, a new sowing is made, which is often necessary in many places. About 10 days later the field is flooded. About one-and-a-half to two months after sowing the superfluous young plants are thinned out by hand, so that in each plant hole only the two strongest remain; on each feddan are about 11,000 to 13,000 double plants. In North America and India only one plant is allowed to remain in each plant hole.

The distance between the cotton plants is usually so arranged that the soil will be entirely shaded by the fully-developed branches; it must, however, be possible to pass through the rows in order to weed and pick the cotton easily. In every individual case the distance between the plants will be governed according to the soil and the growth of the selected kind of cotton. With Egyptian cotton the distance between the plants is on an average 87½ cm. between the rows, and according to nature of the soil, 30 cm. to 50 cm. in the rows; this is relatively close, but may be explained by the fact that in Egypt the light is very strong and the air very dry. The deep shade for the soil is to act as a protection against the evaporation of the humidity of the soil if good crops are aimed at. Through close planting an early ripening of the bolls is obtained, but no doubt the formation of the leaves is increased to the detriment of the bolls. The conviction is to-day generally held that cotton in Egypt is frequently too closely planted, and that with more space between the plants better crops would be obtained.

In Upper Egypt, where the preparation of the soil is, on the whole, not as carefully carried out as in Lower Egypt, the Government recommend on good soil four, on poor soil five ridges per Kassaba, a distance between the plant holes of 40 cm. to 45 cm. on good soil, and 30 cm. to 35 cm. on poor soil, the first watering to be 30 to 40 days, and the thinning out 40 to 50 after sowing. As the cotton plant in Upper Egypt often grows excessively high it is recommended to prune the stalks back so that the plants do not reach higher than 1¾ metres. This is done in order to increase the number of flowers.

*Further Land Preparation.*—From now forward the land is watered more or less according to the retentive nature of the soil, usually every two or three weeks; the best interval is said to be 12 days of irrigation and six dry days. If there is a lack of water the plants can withstand, in the first two months after sowing, a longer drought period than in the following two months.

In 12 waterings 2,000 cm. to 6,000 cm. of water are put on one feddan, which is a total height of  $\frac{1}{2}$  m. to  $1\frac{1}{2}$  m. respectively. In

the time between the waterings, almost to the beginning of the crop, the soil should be repeatedly worked with the hand hoe in order to loosen the surface and to remove the weeds, which are very injurious to the cotton; care must be taken that in this work the young roots of the cotton plant are not injured. Hoeing by hand in the glare of the sun is a tedious work, and requires many workers, as one to two people can hoe only one feddan per day. With the ridge cultivation of Egypt three hoeings are generally given, and in the process of each hoeing a little of the earth is taken from the opposite ridge, with the effect that finally the cotton plants stand on the centre of the ridges.

When the plants are fully developed no further hoeing is done.

*Pruning the Cotton.*—In order to improve the formation and the ripening of the bolls cotton plants have been pruned in many countries after they have reached a certain height. In North America people are, on the whole, against this practice, but in Egypt particularly good crops have been obtained through it in several cases. The pruning is advised when the plants grow too quickly, as in Upper Egypt, and in those districts where cold and rain are apt to put an early end to the vegetation. But the practice of pruning is not generally followed in Egypt. The average height of the Egyptian cotton plant is about 120 cm., but occasionally it reaches a height of 4 m., this is no doubt in such cases where the strain of its forefather, the tree-cotton, breaks out; the general development of the cotton plants in an Egyptian field is much more even and denser than in America, and the different Egyptian varieties are so much alike in appearance, with the exception of the Hindi, that they are difficult to be distinguished even when planted side by side of one another.

*Protecting Plants.*—For the protection against cold, sand-storms, and the dust of the roads, Gambo Hemp = *Hibiscus cannabinus* (Arabic, Til)—is planted in Egypt at the same time as cotton. The hemp is sown round the outside of the fields at a distance of 22 cm. from each plant; the hemp hedge serves also as a boundary. At the end of September or beginning of October the hemp plants, which by that time make a thick hedge, are cut down, and after roasting in water they supply a fibre which is used for ropes and similar objects.

*Cotton Crop.*—The flowering period begins about 100 days after sowing, and the fields with their shrubs of 1½ m. to 2 m. in height, then afford a beautiful aspect; the flower of the Egyptian cotton is yellow, it becomes gradually darker, and before falling off it is dark red. Between the flowering and the boll ripening 45 days elapse.

As all the bolls do not ripen simultaneously they must be plucked in different stages. The crop begins in Upper Egypt at the end of August or the beginning of September. In the Delta, when the weather is favourable, the crop commences about September 10th, but mostly at the end of September or at the beginning of October, and continues right into December, consequently the period of vegetation, from sowing to the harvest, lasts six to eight months (on an average seven months), to which two months must be added for the picking season.

The average number of bolls on one cotton plant, on average soil, is about 65, on particularly good soil about 125. Indeed, one sometimes come across plants which have even 300 bolls, although these do not all get ripe.

The picking of the crops begins as soon as a sufficient number of bolls have burst open, but as the expenses of picking are lower when there is a large lot of open bolls, the picking is usually delayed as long as possible. Care must be taken in this regard that the quality of the lint is not severely injured by rain or thick foggy weather, when the lint is laid bare through the bursting of the capsules. The valuable quality of Egyptian cotton suffers most easily through unfavourable weather conditions. It should further be remembered that with certain varieties of cotton the lint easily falls out of the opened capsules and becomes dirty. In the sowing and weeding of the fields children are often used; at picking time all and everybody has to help, and high wages are offered. Women and children are especially skilled and careful in the picking. A boy will pick in a day 30lbs. to 50lbs., whilst a man cannot pick more than 100lbs.

On account of the heavy dews picking cannot be carried on in the morning, and shortly after 5 o'clock in the afternoon it gets too dark for this work.

The first picking, which begins about three to nine days after a watering, gives the best cotton, and represents about 50 per cent. of the total crop. After picking, a watering is given immediately, and in about three or four weeks later, therefore mostly in October, the second picking takes place, giving about 35 per cent. of the whole crop. After this picking another watering is supplied, and about three weeks later, in November, the third picking is done, resulting in the remaining 15 per cent. of the crop; the quality of this picking is usually inferior. The lint of the third picking is not mixed with the first two pickings, but is sold separately. Some planters pick again towards the end of November or the beginning of December, but these fourth and fifth pickings have only a low value.

In the first picking, when the cotton is plentiful, the planter needs to pay only a small wage; in the second picking the price for the same weight is already a half as much again as in the first, and the price is doubled in the third picking. About 8 okas at  $1\frac{1}{4}$  kgs. of the first picking, 6 okas of the second, and 4 okas of the third will be picked for 1 P.T.

Picking requires not only skill and speed, but also attention, in order that no unripe and poor lint is collected, and that the plants are not injured or broken down. Bolls which have shed and where the lint has become dirty must be collected separately; this cotton is mixed and ginned with "Scarto."

Ten to fifteen pickers on large plantations are under one overseer, and each has to pick two rows of cotton shrubs. With great speed they grip hold, with both hands, the opened bolls in such a manner that the wooden shell remains on the plant, then they remove dry leaves and parts of the capsules which at times adhere to the lint.

The lint is thrown by the pickers into their smock, which has been gathered up into the shape of a sack. On a word of command

the pickers run to a previously marked spot at the side of the field, loosen their girdles, and shake the cotton on strips of sacking which are spread on the ground. Whilst the pickers are again working in the field several men pick out from the heap of collected cotton the inferior lint and impurities, and fill the good cotton in large bags into which it is pressed by a man who gets inside and stamps his feet on the cotton. Finally, these bags, which weigh about 400lbs., are sewn up and sent to the warehouse.

Large planters spread the picked cotton for about four to five days out on terraces, and expose it to the open air, which also gives an opportunity of picking out the poor and badly-stained cotton.

Before the last picking is undertaken berseem is usually sown in between the standing cotton plants, and when the finished cotton stalks have been removed the field is rolled in order that the water can cover the clover evenly.

Otherwise the finished stalks are allowed to stand for a little time, they are then pulled up, and the dry stalks are used for fuel, especially for the numerous steam pumps. Only on rare occasions, on the poor soils of the Delta and in the provinces of Minieh Assiut, and Beni-Suef, where a more careful cultivation does not pay, are the plants cut back even to-day in order to yield another crop in the next year; the height of the stems that remain standing has been reduced from 30 cm. to 10 cm. by a decree of 1911, in order to render the hibernation of the boll-worm difficult.

#### INJURIOUS COTTON PESTS OF EGYPT.

As in all artificial collections of a species of plant, useful to mankind, so in cotton plantations the biological equilibrium becomes disturbed, and the consequence is an increase of pests. In the cotton fields of Egypt a large number of such pests, principally belonging to the animal kingdom, but also those of a fungoid character, cause more or less damage, though probably less than in North America, as through the frequent waterings, the glare of the sun, and the repeated hoeing of the soil, a large portion of the pests are being killed, others die off through the rotations of crops. The change from a three to a two years' crop rotation favours the survival and distribution of the injurious cotton pests; they are likewise encouraged through too freely watering and consequent dampness, fog, and, finally, through the fact that there is no frost in Egypt which might make their hibernation impossible. The strong heat of Upper Egypt prevents the distribution of the boll-worm.

The most dangerous are two butterflies from the owl family, viz., the *Prodenia littoralis* and the *Earias insulana*, the caterpillars of which frequently destroy crops in whole districts.

The caterpillar *Prodenia littoralis* is called in Egypt the "cotton worm"; it comes from a small moth which first seriously appeared in 1877, attacks besides cotton also the Egyptian clover, wheat, barley, maize, and potatoes; it has yearly about seven generations, each living about 30 to 40 days. The moth lays the first eggs, each time several hundreds, in the berseem, goes to the cotton when this has developed, in the middle of May; it fastens its eggs upon the underside of only one or two leaves; the caterpillars which come from these eggs feed chiefly on leaves, and distribute themselves

very rapidly over the whole plant. When the caterpillars are very numerous they attack also the buds. These insects attack cotton from end of April to end of September, and are most injurious in the months of June, July, and August; they do not appear simultaneously everywhere but only locally, one year in this, the other in that district; they chiefly appear in the Delta, particularly in the northern parts. Where the worm is present early in summer the plant has time to recuperate from its attacks, although quality and quantity of the lint suffer from its effects. The damage is, however, much greater when the worm makes its appearance at a later period of the development of the plant. In any case, a plant once attacked by the worm is weakened and its growth is affected, therefore it is more liable to be attacked by the more dangerous boll-worm, which appears only comparatively late in the season. In 1904 the cotton worm caused a damage of £200,000, and in some provinces a third or even half of the cotton fields were infested by it; in 1910 643,000 feddans were attacked by the cotton-worm, and of this area only 6,000 feddans were situated in Upper Egypt.

Outside of Egypt, *Prodenia* is not known to cause any serious damage, probably because it is kept in check by other insects, and the Agriculture Department therefore endeavours to introduce such insects from abroad; some such enemies of the *Prodenia* are already in existence in Egypt. Besides this the only really effective remedy against the cotton worm is, so far, either to pick from the Berseem the eggs and caterpillars or tear off and burn those leaves of the cotton plant which have been infected by the cotton-worm, and as the numerous eggs are always met with on a few leaves only it is comparatively easy to remove them.

The opinion expressed in various books to the effect that the eggs are met with only on the lower leaves of the cotton plant is not correct; they are also found in the middle and upper portions of the plants. Fields of berseem which are severely infested by the cotton-worm should be mown and ploughed under before the worm is able to penetrate into the cotton fields. But the ploughing by means of the Egyptian plough is not sufficiently effective, and therefore it is better to flood such fields which are severely infested by the cotton-worm.

*Earias insulana*, known in Egypt under the name of boll-worm, is much more difficult to keep in check, and the damage caused by it is much more considerable; it has been met with everywhere annually, and has been described in Egypt as far back as 1865. The small butterfly, which has a length of only 9 mm., is easily recognised by its green fore wings and its silvery white dark-bordered hind wings; it lays its very small bluish-green eggs from the beginning of August outside the bolls or on the flower buds, the young caterpillars which come from these eggs penetrate in most cases first the young shoots, later on the young buds and the young bolls; they feed on their contents, especially on the soft, juicy seed kernels, and then they attack other bolls. Young bolls dry up in consequence of these attacks and die, more developed bolls open in consequence of the attack prematurely, and their fibre does not mature. As the caterpillars slip out of the eggs three or four days after they have been deposited, form a chrysalis 15 or 20 days later, and the butter-

flies come out of the chrysalis in a further 10 to 14 days, it is evident that a new generation of *Earias* is brought to life almost every month from May to October, and one can easily conceive how quickly this pest increases. Indeed, the insect may destroy a quarter of the whole crop, and the second and third pickings suffer mostly from its attacks; so there is every reason of introducing early maturing kinds of cotton. The young moth is also found on *Hibiscus esculentus* and *canabinus* (*Bahmia* and *Til*), and for this reason one ought not to allow these to be planted in the neighbourhood of cotton fields. The moth of the boll-worm does not lay its eggs in close proximity to its place of birth, as is principally the case of the cotton-worm; the moth of the boll-worm flies long distances and hibernates as a pupa in the cocoon which are affixed to the stems of cotton, or hibiscus, where the first generation of the boll-worm only finds a bare living, and therefore it does not develop numerously: each further generation, there are six in the year, increases in numbers in proportion to the increasing quantity of food in the field, and towards the end of the season the bolls of cotton and hibiscus are overrun by the caterpillars.

The best means for destroying the boll-worm consists in the destruction of all their food and protection of plants after the termination of the cotton crop in order to starve out the next generation; but when the stems of the cotton plant are stored on the roofs of the neighbouring huts, as is usually the case, the cocoons can develop quite well; these cotton sticks are used up gradually for fuel.

Besides the cotton and the boll-worm, damage is also done by beetles and larvae of beetles, leaf lice, mole, crickets, and especially by a small grey cotton bug. *Oxycarenus hyalipennis*, the last-named, bores into the green capsules with its long trunk with the consequence that many bolls fall off, and many become damaged.

Leaf lice (*Aphis sorghi*) generally appear in August, cause the falling off of the attacked leaf, and consequently weaken the plant. Efforts are being made to overcome the evil by spraying the leaves with chalk.

*Agrotis ypsilon*, or the cut-cotton, is frequently dangerous to growing shoots.

A new enemy to the cotton bolls in Egypt is *Gelichia gossypiella*; this has been described by Saunders in East India in 1843, and was discovered recently in Egypt by Adolph Andres, one of the two entomologists of the Khedivial Agricultural Society. This caterpillar known by the name of pink boll-worm, feeds on the seed kernels, and seems to raise only one generation in one year.

The boll-weevil, so much dreaded in United States of America, is non-existent in Egypt.

Locusts appear in Egypt from time to time; since 1891 they have been found again for the first time in large quantities in 1904, when they damaged the young cotton plants. Generally speaking, they are, however, not serious, and are known to appear frequently only at the Syrian frontier and in the neighbourhood of Ismailia and Suez.

Plant pests are of no great importance in Egypt, with the exception of a fungus which attacks and destroys occasionally the new germinating seed, so that new seed have to be put into the ground. The "wilt" disease, which is so much feared in U.S.A., and consists in the fungus disease of the roots, has been observed in Egypt in 1903, where it caused only slight damage, as the Egyptian cotton varieties appear to be more resisting to this disease. The "Kräusel krankheit" (literally curling disease), which is so serious in East Africa, is unknown in Egypt.

The various artificial means tried so far in Egypt for combating the cotton pests have mostly failed in actual experience, as they have not been sufficiently reliable and cheap, and often have been injurious to men and cattle.

Trials were made with a few strong lamps, the light of which attracted the butterflies, and these were imprisoned in a sweet sticky liquid; only a proportionately small quantity of insects were thus caught.

Later on, it appeared as if the insect trap invented in 1910 by Adolp Andres and George Maire would be successful, as it was intended to catch the moths of cotton-worm, boll-worm, and cut-worm; the apparatus consisted of a square box about  $1\frac{1}{2}$  m. in height, the walls of which are covered in a special way with a fine wire cloth; in the interior are several strips of sackcloth which have been steeped in fermenting alcoholic liquid, the so-called Prodenin; this liquid has the property to attract by its singular smell the moth from long distances. The moth of the cotton-worm which fly a few hours before midnight, enter through a narrow opening into the box, and remain throughout the night on the canvas strips. At daybreak, when they wish to hide themselves, they cannot find the exit and fall in an intoxicated state into a basin of water and petroleum; in this manner thousands of these insects have been caught, more moths of the cotton-worm than of the boll-worm. But on the whole this trap has had little effect on the total quantity, and on further examination the surprising fact was found that as many as 97 per cent. of the female moths caught had previously deposited their eggs, already therefore Andres' trap, which had the advantage of being cheap, is not in much use now; it might be in connection with the cotton-worm.

The introduction of Rogus Lefroyi, a parasite of the cotton-worm, which has been successful in British India and other places in combating these insects, is at present being tried in Egypt, but Willcocks, the chief entomologist of the Khedivial Society, is somewhat sceptical about the influence of these parasites, as their effect is generally felt too late, only after the eggs have been laid.

Willcocks is also sceptical as to another new process; the two Greeks, Manolato and Arghiridis, made the observation that Spanish pepper, which they had planted round the cotton fields, kept at a distance the cotton-worm and the boll-worm. The medical man, Dr. Berard, a Belgian, residing in Alexandria, added a few poisonous plants, such as *Atropa belladonna* and *Hyoscyamus*, and also the Pyrethrum, which must be sown together with the cotton, and in between the plants; the experiments made during three seasons in this manner on areas varying from one-quarter to two feddans have

given satisfactory results. The butterflies avoid such fields, and the caterpillars find their death in them. Similar preventive means have been tried in other countries, but have not proved a great success.

As early as 1883 and 1884 the Egyptian Government nominated commissions who were to consider what steps should be taken against the pests of cotton, but the fatalistic fellahs took no notice of the directions, as the appearance of the cotton-worm varies in number and locality. After the bad year of 1904 the Government issued energetic instructions for the destruction of the cotton-worm by compulsory work, for which payment was made. Culprits were threatened with fines of £1, or one week's imprisonment, and in 1905 and 1906 a special staff of English officials was engaged in order to assist the provincial authorities in their duties of carrying out the law. This system was continued in 1907, but the control from the central administration was not as strict, and in 1908 it was thought that the local authorities, together with the cotton planters, could exercise the measures without the help of the central administration, and therefore the European inspectors were withdrawn. The instructions were exactly as in the former years, but not only the fellahs, but also the large landowners proved to be very negligent in following out these instructions, and the caterpillars reappeared very quickly. For the purpose of seeing that the law of 1905 was carried out, the Government engaged, in 1909, 77 inspectors, mostly Englishmen, and 167 assistants, also 110,000 children; the latter had to collect and destroy the eggs in those districts where there was a shortage of labour.

On account of infringements against this ordinance, no less than 11,000 planters and 650 local authorities were punished in 1909.

At the end of 1909 the Government introduced a new law, according to which the farmers have to pull up and remove from the fields by December 31st in each year the cotton sticks and roots of Hibiscus esculentus and cannabinus (Bahmia and Til), which during the winter serve as food and concealed shelter for the boll-worm. If this law is well obeyed, it will undoubtedly show good results. The peasants ought to be made to conform to it through the Omdeh (or head of the village), who has been entrusted with the inspection of the fields; he is generally himself a cotton planter.

It is a fact that in 1911 19,845 persons were punished for omitting to give notice of the presence of the pest, and 3,137 officials were punished for negligence in the carrying out of the work of combating the insects. The cotton-worm was more numerous in 1911 than ever; 830,000 feddans were infected, mostly several times, against 643,000 feddans in 1910. In most of the districts 5 to 8 per cent. of the crop were destroyed, in some only 1 to 3 per cent., but the districts which had suffered most severely showed a loss of 16 to 20 per cent. of the crop. The cotton-worm was especially numerous in the second half of July, and it was possible only by using the whole staff and by energetic action on the part of the Government officials to overcome its ravages. 176,000 people were engaged (against 106,500 in 1910) in the collecting and destroying of the leaves attacked by the cotton-worm caterpillar. The boll-worm,

however, made its appearance in 1911, only at the end of the season, when almost all the cotton had been picked; this, no doubt, was the result of steps taken in the previous year.

In 1911, under the chairmanship of Prince Hussein, the Government appointed a special commission, whose object was to find means for combating the cotton pests. Meanwhile, the Government has taken on its own initiative further steps: The people are taught regularly in the mosques on Fridays, after prayer, and at the nightly meetings in the house of the Omdah, all about the cotton-worm; a book with questions and answers about cotton pests has been issued for the use of the Kuttabs (native schools), and with the same object in view 10,000 coloured illustrations, showing the different stages of the cotton-worm, have been disseminated by the Government. The staff of inspectors and officials was further increased in 1912, and although the boll-worm made its appearance in some districts in large numbers it cannot be said that the crop suffered severely.

In order to prevent an introduction of foreign insects the importation of U.S.A. cotton seed has been prohibited since 1904, and since 1909 this restriction has been extended to cotton seed from all countries.

A special Société entomologique has been in existence in Cairo since 1907.

#### YIELD.

The yields vary, of course, according to quality of soil, preparation of the land, irrigation, manure, weather, and insect pests.

A good crop requires an abundant supply of water during the growing period, mild weather during the time of flowering, which, in Egypt, almost always exists during the dry summers and autumns. Detrimental are an excessively high Nile, cool weather, fog, and the presence of caterpillars; the most critical time for the crop in the field is between the middle of August and the middle of October, when fog, as well as the boll-worm, may cause great damage.

Very important is warm weather in November; this means the prolongation of second picking and a good third picking, therefore an increased yield. On the other hand, early rains and cold temperatures in November may cause the crop to come to a sudden finish.

The heavy black alluvial soil gives the best yields as regard quality and quantity, whilst on light sandy soils a smaller crop is obtained, although there may be plenty of growth.

The average yield of the original Jumel came during the first years to 8 kantars per feddan, and in 1862 it was in some districts still 7 kantars; at the present day on large plantations 3, 4, and 5 kantars are picked; on small holdings, with improved cultivation and ample water, 6 to 7 kantars are obtained. Good soil in the Delta produces up to 8 kantars, and in the Fayoum and other parts of Central Egypt, where the soil has not yet been so much exhausted, 8, 10, and even 15 kantars have been picked. On the other hand inferior soils show only from 2 to 4 kantars. The yield on the State Domains went up from 2·10 kantars in 1882 to 5·42 kantars in 1897, then it fell again to 3·73 kantars in 1904, and 4·15 kantars in 1906.

In comparison with the other two large cotton-producing countries of the world, the average yield per acre in the same period, from 1898 to 1910, is as follows :

East India.	United States of America.	Egypt.
80 lbs.	.. 194 lbs.	.. 450 lbs.

The yields per feddan for the principal varieties of cotton are :

	Ash-mouni.	Joano-vich.	Abbassi	Sakella-ridis.	Mitafifi.	Assili.	
Average crop on best soil .....	3—5	4—7	4—7	4—7	4—8	5—8	big kantars
Yield of 315 pfd. seed cotton ..	90—100	98—105	102—108	98—105	102—112	108—115	lbs. lint.
Ginning out-turn	28½—31½	31½—33½	33½—34½	30—31	33½—35½	34—36	per cent. lint
Yield per feddan.	121—223	176—329	183—338	180—330	229—401	242—412	kilogrammes

The figures concerning the area put under cotton in Egypt are available only since the middle of the eighties, and in the second half of this decade shows 919,000 feddans, for the nineties an average of 1,000,000 feddans; further details are shown in the accompanying table :—

Season from 1st Sept. to 31st Aug.	Cotton area in feddans.	Total crop in kantars.	Yield per feddan in kantars.
1895—1896 .....	977,735	5,256,128	5·38
1896—1897 .....	1,050,747	5,879,479	5·60
1897—1898 .....	1,128,804	6,543,628	5·80
1898—1899 .....	1,121,261	5,588,816	4·98
1899—1900 .....	1,153,306	6,509,645	5·64
1900—1901 .....	1,230,320	5,435,488	4·42
1901—1902 .....	1,249,884	6,369,911	5·10
1902—1903 .....	1,275,680	5,838,790	4·58
1903—1904 .....	1,332,510	6,508,947	4·88
1904—1905 .....	1,436,708	6,313,370	4·39
1905—1906 .....	1,566,601	5,959,883	3·80
1906—1907 .....	1,506,290	6,949,383	4·61
1907—1908 .....	1,603,224	7,234,669	4·51
1908—1909 .....	1,640,415	6,751,133	4·12
1909—1910 .....	1,559,271	5,046,604	3·24
1910—1911 .....	1,642,610	7,573,537	4·61
1911—1912 .....	1,711,241	7,424,208	4·34
1912—1913 .....	1,721,815	estimated at 7½ millions.	4·50

The increase in the cotton area since 1895-6, in which season the gradual increase in the water-holding capacity of the weir at the point of the Delta was commenced by means of structural alterations and improvements, up to the year 1907-8, when the advantages of the Assuan reservoir, and of the barrage at Assuit and Zifta were already beginning to be felt by the country, is clearly visible from the preceding table. This table also shows that between the years 1908-9, contrary to U.S.A. and the East Indies,

where the average yield has latterly been constantly rising, a remarkable decrease in the yield of the Egyptian cotton fields has taken place; at the same time, we can notice a distinct falling off in the average quality, although increased prices have balanced the loss in quantity, yet this falling off became so dangerous for the entire economics of Egypt that close studies as to the causes became necessary.

In 1908 the Khedivial Agricultural Society appointed a commission, consisting of notable landed proprietors and Government officials, for the purpose of examining the cause of the retrogression in the yield. Their work was connected with many difficulties, as the statistical figures, especially of the small plantations, left much to be desired. The result of these investigations, published in May, 1908, stated as reasons for the falling off : —

- (1) Deterioration of the soil by the adoption of a two years' rotation of crops instead of a three years' rotation.
- (2) Insufficient watering during the summer.
- (3) Insufficient drainage in certain districts.
- (4) Insufficient selection of seed.
- (5) Insufficient manuring.
- (6) Increase of insect pests.

In the year 1908 the Government instituted a special service in the Survey Department in order to obtain detailed information as to the areas put under cotton, and, further, to collect regularly statistical information as to the influence of the level of the subsoil water on the growth of the plants.

After the sad results of the cotton crop in 1909-10, the Government, as well as the Khedivial Agricultural Society, appointed, in 1910, other commissions for the purpose of examining the reason for the retrogression in the yield of cotton, and in 1910 these published their report.

Without having come to quite positive results, the following reasons have been stated in explanation of the decrease in quality and quantity :—

(1) *Deterioration of the Seed.*—This takes place in all kinds of cotton, as experience has shown, after a number of years, in Egypt on the average in about 22 years. For this reason the Afifi kind, which has up to recently been generally cultivated, is being replaced by new kinds. Serious measures ought to be taken with regard to the inferior "Hindi" quality. Even so-called good quality of seed contains in the old-established kinds of Mitaifi and Abassi up to 8 and 10 per cent. of Hindi seed; in the newer kinds, as for instance Nubari, only 4 per cent. But as the fellah buys his seed not only according to cheapness, but also from doubtful sources, one may easily imagine how much worse such seed must be than the so-called good seed. It is said that Hindi amounts to an average of 6 per cent. of the entire crop.

(2) *General exhaustion of the soil*, which is specially noticeable in Lower Egypt.

(3) *The extension of the cotton-growing area* in the less fruitful Upper Egypt, and to poorer soils in Lower Egypt, which, of

course, reduces the average yield. Formerly, only the best fields were used for the cultivation of cotton.

(4) *Too small a distance between the plants.*

(5) *The change from the three years' rotation* of crop to the two years' rotation, and the consequent exhaustion of the soil, whilst in 1894 as much as 83 per cent. of the area under cotton was subject to a three years' rotation, and only 17 per cent. to a two years' rotation, this proportion had entirely changed by the year 1908, in consequence of the high profits resulting from the cultivation of cotton, the figures were then 56 : 44. It is true, against this argument must be stated the fact that the State Domains, which had adhered to the three years' rotation, showed the same falling off.

(6) *The less intensive cultivation* of the land during the last years, as the individual labourer had to look after 32 per cent. more land in 1907 than in 1897. With all that, the value of the cotton crop per head of the agricultural population has been doubled during the last 15 years, and the fact that the fellah has got a larger income with a smaller crop and less work, does not stimulate him to try to obtain an increased yield.

(7) *Increase of the insect pests* on account of the greater extension of the cultivations and the temporary withdrawal of the European inspectors, who saw to the carrying out of the laws for the Government. This service has again been installed.

(8) *The application of artificial manures* can have little importance as one of the supposed reasons for the falling off, as so far only about 5 per cent. of the agricultural lands were treated with it. The quantity and the mixing of the manuring, nevertheless, may often leave much to be desired.

(9) *The Assuan dam*, it was said, holds back the rich substance of the Nile water, and the latter had lost its old fertility, as the silt is precipitated now in the slower-flowing stream. This view has been repudiated by experts, because during the flood, during which time alone the muddy water from the Abyssinian Highlands flows in the Nile, the reservoir is left open and therefore cannot have any influence on the fertile water. Besides, it seems that the fruitful properties of the silt are somewhat overrated.

(10) *Irrational watering* during the rotations. It is thought that the cotton plants are left standing too long dry at the time of the setting of the bolls in July, but if the use of the water were free at all times the fellah would make too liberal a use of the water, and this would be favourable to the development of the plant, but at the expense of the bolls during the ripening time. Too much water in the field causes the formation of injurious fogs, but insufficient watering is the cause of the rising of the salt.

(11) *The rising of the subsoil water* in the whole of the Delta through the raising of the level of the irrigation canals, causing the tap-roots of the cotton plants, after a certain period of growth, to reach a soil which is stagnant, not porous enough, and too retentive. The drainage in some districts, especially in the Northern Delta, is undoubtedly insufficient, especially considering that the

natives have the tendency to irrigate too much when there is plenty of water, so that the drainage canals become choked. But the decrease in yield also took place on higher situated plantations where artificial drainage does not come into question; it is true, in Upper Egypt the average crop has not decreased.

(12) *Fraudulent mixing.*—The falling off in quality was partly attributable to the increasing practice of small native dealers in Lower Egypt, who were in the habit of mixing cheap Ashmouni seed cotton from Upper Egypt with Mitafifi; these two kinds were ginned together, and the lint was sold as Mitafifi. The further effect was that the small fellah used this mixed Afifi seed for sowing in the Afifi districts. The Government considered measures for the prevention of this fraudulent mixing, for it is said that latterly as much as one-eighth of the entire crop of Upper Egyptian cotton had been used for this fraudulent admixture, and in the spring of 1912 a law was passed, according to which the transport of unginned cotton between Upper and Lower Egypt was permitted only with a written permit of the Agricultural Department, the boundary being near to Rodah. In cases of contravention the cotton will be confiscated by the Government, and money fines and imprisonment were imposed. The Government may at any time stop this transport altogether. It is true that the mixing of cotton from Upper and Lower Egypt has been stopped through this law, but in Damanhour, the place most noted on account of its fraudulent practices, one has found means to circumvent the law, by adding in the place of the Ashmouni some 20 to 25 per cent. of the much inferior "Okr" cotton from the districts of Rosetta and Fena, which is a species of cotton coming from a perennial plant.

— (13) The suggestion has been thrown out that the *climate* of Egypt had changed, but observations at the chief meteorological stations do not prove this.

In any case, the explanation of the deplorable decline may have been caused by a combination of circumstances, differing according to the varying circumstances of several districts.

So far, the causes of the poor crop in 1909 and those of the good crop in 1910 are not definitely known. Carelessness of the Egyptian population plays a prominent part, and it must be feared that the good crop of 1910 has driven away once more all cares for the future, although the improvement of affairs in 1910 was partly attributable to outside factors, for example, the unfavourable cotton crop in North America.

A higher average yield of the Egyptian crop must still be aimed at, and at the same time an extension of the cultivation of the better kinds of cotton.

## COST OF PRODUCTION AND RENTABILITY.

## AVERAGE MINIMUM COST OF PRODUCTION FOR ONE FEDDAN OF COTTON LAND.

	Best Delta soil.	Upper Egyptian soil.
Rent of the land.....	£E. 8 to 12	.. £E. 6 to 8
Land tax, in the Delta 50 to 164 P.T., in Upper Egypt 20 to 100 P.T. ....	=P.T. 150	.. P.T. 80
Ploughing, preparation of soil, construction of irrigation ditches, 70 to 100 P.T. ..	,, 70	.. ,, 70
Cost of the seed .....	,, 25	.. ,, 20
Sowing .....	,, 30	.. ,, 30
Manuring, 40 to 100 P.T. in the Delta, 0 to 50 P.T. in Upper Egypt.....	,, 45	.. ,, —
10 to 12 waterings with own pumps, or bought water .....	,, 100	.. ,, 100
Thinning out and hoeing Picking .....	,, 120	.. .. 100
Killing of pests .....		
Pulling up of the stalks, 10 to 12 P.T.....	,, 10	.. ,, 10
Without rent of the land .....	P.T. 550	.. P.T. 400
	= £E. 5½	.. £E. 4

\*These three items have been expressed by one figure, as when many insects make their appearance the cost of exterminating them is very high, the picking expenses on the other hand being low, owing to a reduced crop; the wages for picking are therefore very uncertain.

In the United States of North America it is estimated that the cost of production is about the same, viz., on one acre exceptionally 500lbs.=5 kantars with a profit of about \$23—in round figures 500 P.T., but on the other hand, the land rents in America, say about \$6 per acre, are much cheaper than in Egypt.

## NET PROCEEDS FROM ONE FEDDAN OF COTTON LAND.

Lint cotton, average 4 kantars, in Upper Egypt only 3 kantars, at Jalleri 17 = Jalleri 68 .....	= P.T. 1,360
Cotton seed, 8 kantars = 6 hl. after deduction of the ginning charges .....	,, 100
Stems of the cotton plants 8 kantars, uncertain yield, often unsaleable .....	,, 40
In round figures .....	P.T. 1,500
Cost of cultivation exclusive of the land rent .....	,, 550
	<hr/>
	P.T. 950
<i>Clear profit of the cotton year .....</i>	£E. 9½

As cotton can at the most be cultivated only every second year in the rotation of the crops, and the clear profit from the other rotation crops (wheat or barley and clover), after the deduction of the expenses, which altogether may be estimated at about

300 P.T. to 400 P.T. per feddan, we arrive for two years at a total net profit of 1,300 P.T., or on an average 650 P.T. = £E6½ per year.

This is for the small peasant, who, with his family, cultivates the land, and who is often able to make a larger profit than the above-mentioned, quite a nice remuneration, which, as experience has shown, enables him, especially in a good year or with high prices for cotton, to save sufficient money to buy more cotton land, if he feels inclined to invest his savings in that way.

But an important factor which has not been taken into consideration in the above calculation is the question of interest on the value of the land.

One feddan of good cotton land costs between £E130 and £E160, and when let gives in rental 6 to 10 per cent. per year. Consequently the fellah who does not own land, and cultivates cotton as a tenant, is only in a favourable cotton year able to earn the £E8 to £E10 for rent, but when the year turns out to be unfavourable for cotton he places himself in great danger of getting heavily into debt. He tries to raise the profits of the intervening year by a cultivation of vegetables, cabbages, egg-fruit, bamiah, melons, colocasia, and so on; but even then his position is not enviable, and it is not a rare occasion that he sinks to the position of a poor labourer.

A second valuation, obtained from a bank, of the cost of cultivation and the profits from one feddan of cotton land, gives the following figures :—

#### EXPENDITURE.

*First year:* Cotton cultivation, then berseem, which is ploughed under after the first cut.

EXPENDITURE.	RECEIPTS.
1st year : Cotton cultivation, then berseem, after one crop is ploughed in :	
Ploughing : Labourers 24 + P.T. cattle 70 .....	= 94
Manuring : Labourers 10+ cattle 10 + Manure 100..	= 120
Harrowing and ridging : Labourers 10 + cattle 20	= 30
Sowing and re-sowing : Labourers 15 + Seed 50..	= 65
Thinning out .....	6
Hoeing .....	35
Work of watering .....	68
Picking off caterpillars .....	20
Cotton Picking .....	75
Pulling up stems .....	12
Cost of cultivating berseem	150
Land tax .....	165
2nd year : Wheat and Maize :	
Cost of wheat cultivation ..	200
Cost of maize cultivation ..	200
Land tax .....	165
	<u>P.T. 1,400</u>
1st year :	
5 kantars of cotton at £E4. ....	= 2,000
Cotton sticks .....	25
Berseem .....	200
2nd year :	
Wheat .....	650
Maize .....	500
	<u>P.T. 3,375</u>
Expenditure as above and 100 P.T. for general expenses ..	<u>1,500</u>
Profit in 2 years .....	1,875
Profit in 1 year .....	937

This statement refers to large plantations in own regie.

If the land is farmed on the small-holding system without need of cash payment for labourers and work performed by cattle, then the profits are as follows :—

Total receipts in two years .....	P.T. 3,375
Seed for cotton, berseem, wheat, and maize .... P.T. 200	
Land tax ..... , 325	
	, 525
Net profit in two years .....	, 2,850
Net profit, average per year for 1 feddan .....	, 1,425
If one takes an area of 5 feddans, then the receipts for the year are .....	P.T. 7,110
Less cost for keeping and clothing a family of at least five persons at £E.4 per month .....	, 4,800
Yearly net profit on 5 feddans .....	P.T. 2,310
	= £E. 23·10

which amount, as has already been pointed out, will hardly cover the interest on mortgage. If we suppose that the owner of five feddans of the best cotton land, of a value of £E800, has mortgaged his plot up to 50 per cent. = £E400, against payment of interest at 7 per cent. per annum = £E28, he would not be able to meet his engagements.

It may seem singular that under such circumstances the rents are so high. This again depends upon the onesidedness of the Egyptian peasants, who do not know any better work in life than to cultivate the soil, and with a certain childish carelessness they acquire land at any price, by buying or renting.

One can, nevertheless, maintain that the small holdings, managed in the manner of the natives, bear interest at from 5 to 10 per cent., as with their primitive method they have hardly any general expenses, their wages bill is very low, due to the patriarchal conditions, and finally the fellah has a considerable income through the sale of vegetables, poultry, eggs, and milk.

On the other hand, plantations on a large scale, managed by Europeans, even where the cotton soil is good, are not very remunerative, as with the high price for agricultural land, such as it has ever been since 1906 in the whole of Lower Egypt, the revenue on the whole of the capital invested, after deduction of the general expenses, which are always considerable, cannot be commensurate with the conditions obtaining in the country. It is therefore more advisable, and indeed it is more generally the custom, to let the land in small holdings, and in doing so attention must be paid that no frauds or defalcations are committed, in order to ensure a continuous rentability. Besides, most of the large estates of native owners have been in the family for many years, and have been purchased long before the price of land reached the present high level; many of these estates have, during the last few decades, vanished, partly owing to division into small holdings, and partly owing to the sale of the land.

The conditions when dealing with large estates or with land companies change to a certain extent, when the cultivation of inferior soil is taken in hand, but the yields obtained from such lands, amounting to about 1 to 2 kantars cotton per feddan, do not cover the high cost of land improvement, and are, of course, not sufficient to pay a fair revenue on the cost of the land and of the improvement. For instance,

Price of the land £E40, plus cost of improvement £10 to £15 at 8 per cent per annum .....	£E. 4 but
Receipts from 2 kantars cotton at \$17 .....	£E. 7
Receipts from cotton seed .....	„ $\frac{1}{2}$
	£E. 7 $\frac{1}{2}$
Less cost of cultivation .....	£E. 4
	„ $3\frac{1}{2}$

Showing a loss per feddan of ..... £E.  $\frac{1}{2}$

It must be admitted that under exceptionally favourable local conditions, where labour is plentiful and cheap, the fertility of the soil enhanced by means of an excellent system of irrigation and drainage, and if the management is in the hands of experienced experts, even a European undertaking may be made remunerative, but such plantations which pay 7 to 9 per cent. (this might be considered a satisfactory return on the capital in Egypt) are extremely seldom met with.

The large owners of land, instead of cultivating themselves the improved land, prefer therefore to let it in small lots to the fellahs, and after a few years they try to sell it at as high a price as possible. As in such purchases of land cash payments are only on rare occasions made, it is usual that the seller of land is interested in his property for many years after effecting the sale, and he tries to remedy this drawback by transferring the mortgages on one or the other of the existing Mortgage Banks. Unfortunately, it occurs frequently that the improved land, for lack of proper supervision, deteriorates owing to the primitive method of cultivation, and, of course, its value also decreases, thus causing a loss to all interested parties. The following tabulation of the dividends paid or of the net profits earned by the land companies during the last few years shows this effect :—

*Société Anonyme du Béhéra.*

Established 1888. Share capital, 1908: £E737,500.  
Debentures, 1908: £197,125. Reserves, 1908: £62,645.

	1899	1900	1901	1902	1903	1904
Dividend, per cent. ..	0	0	5	5	5	5
Net profit, £E. .....	—	—	—	13,486	14,418	24,269
	1905	1906	1907	1908	1909	1910
Dividend, per cent. ..	105	105	5	5	7	8
Net profit, £E. .....	24,428	28,605	34,913	44,084	42,106	—

Even in 1905 and 1906, only 5 per cent. in cash have been paid, and the remaining 100 per cent. have been distributed in shares belonging to affiliated companies of new Egyptian Land Companies, so that the real profit is equal to those of the other years, and the difference shown in the above list is only existent on paper.

*Aboukir Company, Ltd.*

Founded 1888. Share capital, 1908: £300,000.  
Debentures, 1908: £100,000. Reserves, 1908: £63,624.

	1899	1900	1901	1902	1903	1904
Dividend ordin. shares, per cent.....	3	3	5	55	25	18
Dividend def. shares, per cent.....	0	0	0	—	—	7
Net profit, £E. ....	—	—	—	46,860	19,386	23,048
	1905	1906	1907	1908	1909	1910
Dividend ordin. shares, per cent.....	7	107 } 7 } Dividend def. shares, per cent.....	8	8	8	8
Net profit, £E. ....	28,465	99,473	41,828	28,610	31,449	28,974

*Société Anonyme Agricole et Industrielle d'Egypte.*

Established 1895. Share capital, 1909: £482,188.  
Debentures: 4 and 5 per cent. in 1909, £1,255,992. Reserves,  
1909: £212,174.

	1899	1900	1901	1902	1903	1904	1905
Share capital, per cent.....	6	6½	7	7½	8½	9	9
Share dividend, „ .....	5	7½	10	12½	26½	30	30
Net profit, frcs. ....	18,534	23,156	27,222	31,671	62,160	67,350	80,616
	1906	1907	1908	1909	1910	1911	
Share capital, per cent.....	9½	11	5	5	5	0	
Share dividend, „ .....	45	60	0	0	0	0	
Net profit, frcs. ....	88,013	102,486	96,088	1,715	11,989	11,988	

*Egyptian Delta Land and Investment Company, Ltd.*

Established in 1904. Share capital, 1909: £324,250.  
Reserves, 1909: £198,039.

	1906	1907	1908	1909	1910
Dividend, per cent. ....	0	15	2·1	0	0
Net profit, £E. ....	2,545	32,995	11,220	1,316	6,439

From this tabulation it is evident that the cultivation of cotton alone, even at high prices, is not sufficient for obtaining a steady and

regular return on capital invested on plantations which are under European management. It proves that they must make profit on the sale of land, and these, of course, will be non-existent in times of economic depressions. It must, however, be stated that the companies mentioned have been established principally for the purpose of improving barren land, and to sell it after reclamation. The agricultural working is with these companies only a side issue during the interval of reclamation and the sale of the property.

#### PURCHASE OF COTTON.

The purchase, the ginning, the pressing, and the exportation of cotton are some of the most remunerative occupations in Egypt, and large and wealthy firms which, in spite of a number of critical years, enjoy the best prosperity, are engaged in these branches of business. The whole of this commerce is in the hands of Europeans, and numerous Christian and Mohammedan dealers buy from the peasants their produce in the villages, and deliver it to the ginning factories or to the exporters. The economic fight with the Levantine Greek as to the pre-eminent position in commerce is everywhere severe. Greeks are at the head of the large export firms in Alexandria, and the employés of the European export houses in the interior are almost exclusively Greeks; they serve as medium between Europeans and natives in the interior, and cannot be missed there. Although there may be amongst the Greeks a large percentage of unscrupulous persons, it must be admitted that a great number of Greeks are industrious, frugal, and hard working.

Alexandria is not only the largest city of export in Egypt, but it serves also as a central market for the purchase of the produce. The agents of the cotton firms and of the ginning factories travel all over the country, not only to buy the crop when it has been picked, but also to make early contracts for the growing crops, which are at times even bought for future delivery so far ahead that frequently the seed has not yet been sown when the crop is sold.

The following paragraphs explain the method of purchase and intermediary trade :—

Seed cotton is always bought on the basis of the "large" kantar of 315 rottls, because, for the sake of simplicity, it has been accepted as a rule that 315lbs. of seed cotton give 100lbs.=1 kantar of lint, although, as a matter of fact, the yield fluctuates from 90lbs. to 115lbs. As a rule, however, it is *over* 100lbs.

The purchase of cotton is effected in two ways : (1) Through the exporter direct from the planter, from whom he buys the crop when ready, or whilst growing, or even before sowing. It is the rule to give £.E.1 advance per kantar, without calculating interest. The exporter has this cotton ginned either at his own factory, or, if he does not possess such, at another factory, which generally charges one standard price, viz., 7 P.T. per kantar. The price is slightly higher in Upper Egypt. The cotton is then sold by the exporter direct to the spinner. (2) The cotton is bought by commission agents, mostly Greeks or Arabs, who get it ginned and sell it in the Alexandria market, which is known under the name of Minet-el-Bassal.

The first method is the one principally adopted between exporters and large plantation owners. It may be said that quite one-third of

the crop is bought in this manner. The second method is in vogue principally with the small farmer, and the small commission agent charges enormously high interest.

The large Alexandrian firms, Lindemann and Carver, have their own agricultural experts, who are constantly travelling all over the country in order to report on the state of the crop, and control to some extent the planters who have received advances.

Only on very rare occasions is cotton bought by the ginning factories.

There are two modes of doing business between the ginning factory and the planter :—

Firstly, the ginning factory buys the seed cotton from the planter for its own account, and sells lint and seed to the Alexandrian exporter. Sometimes it sells the cotton through its own agents in Europe direct to spinners. The suppliers, people who in this manner supply the cotton to the ginning station, are principally large owners of plantations or the Domains. As far as the small farmers are concerned, the ginning factories grant them advances on their crop against payment of interest, which amounts to at least 8 per cent., but frequently it is much higher, and when they deliver the seed cotton they receive only the difference which remains in their favour. The cost of transport of the cotton from the producer to the ginning factory, and from there to Alexandria, are mostly for the account of the ginning factory. This method of direct purchase and sale is, comparatively speaking, little used, and only possible for large firms, which keep special agents in the principal districts. They buy the cotton against 2 or 3 per cent. brokerage for the account of the ginning factory from the producer.

Secondly, the ginning station returns to the planter the ginned cotton, and does not interest itself in the sale. In doing so, the ginning factory keeps either the seed in payment of the ginning expenses, but as its value is higher than the cost of ginning, the factory has to pay about 25 P.T. per kantar, according to the ruling price of seed; or the owner of the cotton insists upon the return of the lint and the seed, and pays for the ginning a certain rate per kantar.

In 1905 a limited company was established under the name of "The Associated Cotton Ginners of Egypt," by the various large cotton exporters of Alexandria, with £360,000 in ordinary shares and £150,000 in debentures. In this concern are amalgamated some of the largest ginning factories. It controls 1,200 gins, and aims at a perfect system of ginning. The Associated Cotton Ginners do not act as purchasers of cotton; the individual firms buy, and therefore this large company does not influence the price. The activity of the concern is limited to the Delta, where in 1912 it owned 14 factories, with 1,337 gins, and these ginned more than a third of the entire cotton crop of Lower Egypt.

The intermediary trade is of considerable importance in the Egyptian cotton business. A large number of dealers live in the provincial towns of the cotton districts. They buy the crop from the fellahs, have it ginned, and sell it in Alexandria. These dealers

are mostly Greeks, and sometimes exact usurious terms. Their purchases are made chiefly in the following three ways:—

(1) Against cash payment on delivery of the cotton. This method excludes, of course, any extortionate practice.

(2) Against payment in advance, or partial payment in advance, of the future crop. In such transactions the value of the crop is estimated at a very low figure. This kind of business is nothing else but usury, leaving a profit from 25 to 30 per cent. and more. These usurers are the plague of the poor fellah. Nevertheless, the latter keep applying to them in many cases, rather than go to the mortgage bank, the reason for this being that the latter are compelled to insist upon certain formalities, and in case of non-payment are obliged to take possession of the mortgaged property. The usurer, on the other hand, grants delay.

(3) By future contracts, where the price is fixed later on. In this mode of business the planter delivers the cotton to the dealer, and receives from him the approximate cash value. The planter, however, reserves to himself the right to fix the price definitely within three or four months after a date fixed in the contract, in accordance with the quotation at the Alexandria Exchange. This system of the sale of cotton, with a later final fixture of price, is almost generally in use between the large planters and the dealer.

As gambling and speculation are everywhere strongly in evidence in Egypt, this method of doing business offers great scope in this direction. Instead of being content with a small, but safe profit, the Egyptian farmer always aims at the highest level of prices, and frequently finds himself a heavy loser in the long run, as he misses the judicious moment, and is finally compelled to sell at any price, especially when he is bound to pay to the banks interest on mortgage, or redeem advances made to him. It is interesting to note that the planters have sold during 1912 a large portion of their crop at fixed prices, having evidently profited by their recent unfavourable experience.

When the fellah has made during the summer contracts according to the second method at comparatively low prices, he will, if prices are going up appreciably, at times hide his cotton, or, at all events, some of it, in order not to be compelled to deliver. In this manner cotton has been found hidden under wheat and other produce.

The first picking is always sold at a higher price than the second and third, and the sale of the latter is generally more difficult.

In all purchases of seed cotton the buyer runs the risk as regards the outturn, because not every lot of cotton gives an average outturn of 105 to 106 rottls lint, and even the greatest care, such as, for instance, the ginning of a trial sample, does not always guarantee the ginning outturn of the whole lot.

The majority of the provincial contracts, especially of the important ones, are made by brokers on the basis of a sample shown. The cotton delivered against this sample is put in sacks, which are marked with the name of the kind of cotton, the class, and the name of the planter. The sacks are pierced in order to facilitate the examination of the contents.

The smaller transactions are somewhat differently carried out. During the cotton season, in the centrally-situated districts of the cotton-growing provinces, special cotton markets are held to which the small planter sends his crop. The dealers buy it, after a personal examination of the whole. In the height of the season these cotton markets show a picture of animation. The Egyptian Markets Company, established in 1898, with a capital of £175,000, has obtained a concession for 30 years for the construction and management of markets in 120 centres in Upper and Lower Egypt, which have taken the place of the former markets; these were not held under any roof. Latterly the seed supplied by the Government has been sold in these markets.

When the fellah sells his seed cotton to a dealer, a special clause in the contract states whether the cotton has to be delivered free on the farm or free to a certain place of destination.

The method of transportation of the seed cotton from the village to the nearest town which has a ginning factory depends entirely on the distance and the means of transportation which are at the disposal of the fellah. If the distances are not great, camels are used. They carry a bale of cotton on either side, and the general charge for a distance taking  $2\frac{1}{2}$  to 3 hours is 6 P.T. per camel. Where the roads are in good condition, carts drawn by horses are used for the transportation of cotton, and the cost of these means of transportation may be said to amount to a small piastre tarif per kilometre and bale. The few kantars which make up the crop of the small farmer are carried on the backs of donkeys to the markets of which we have spoken above. Such cotton is frequently not even put into bags, but simply wrapped up in a piece of sacking. Country roads with a firm metal were known until quite recently only in the nearest neighbourhood of Cairo and Alexandria, but latterly better roads of communication are becoming more numerous in the country. If the village is connected with the town where the ginning station is, either by the Nile or navigable canals, the transport of the cotton is made by water, and as the network of canals is widely spread all over Lower Egypt, we find this means of transport in extensive use. This river transport is also used for forwarding the ginned and pressed cotton from the ginnery to Alexandria. The ginning stations save in this manner on carriage; the railway company charges 5 P.T. to 7 P.T. per kantar against 3 P.T. per boat. The tolls on bridges have now been abolished. As all industrial centres of Lower Egypt are connected with Alexandria through the railway, this is used to a very great extent for the transportation of cotton, especially since the rates have been reduced. The railway, which was begun in 1856, and shows to-day 4,120 kilometres, is owned, two-thirds by the State and one-third by private companies. The network of railway is very close in the Delta. Besides the State Railway there are three light railways, the material for which has come mostly from Germany. These are in the hands of private companies, and are fairly remunerative. Of all agricultural produce, cotton is the principal item as regards railway freight. The railway service has been organised according to the English system, and the length of the main lines is :—

Alexandria to Cairo, 209 kilometres.

Cairo to Shellal, 890 kilometres.

Cairo to Port Said, 233 kilometres.

Cairo to Suez, 250 kilometres.

The cotton trade has in each province certain centres, where there is always active commercial life, and the European buyers, the ginning factories, and presses have their quarters. The largest export houses of Alexandria have their branches here, together with their own ginning factories, but the central administration is situated in Alexandria. The four principal centres of Lower Egypt are Karf-el-Zayat, Zagazig, Mansourah, and Mehalla-el-Kebira, where the majority of the ginning factories are situated, and these are largely owned by Alexandria firms. Then follow Zifta and Tantah, large places of commerce, but less important as regards industrial life, and, finally, there are 33 places which are each able to show a turnover of 10,000 kgs. to 100,000 kgs. The Ministry of the Interior decided, in 1912, on the initiative of Lord Kitchener, to establish in each province markets and stores for cotton. In these markets the fellah can have his cotton properly weighed under Government supervision, and the market prices ruling in Alexandria are published in order to protect the fellah from the fraudulent practices of unscrupulous middlemen. These so-called "Halakas" had to withstand the opposition of certain individual interests, but they seem to be becoming gradually popular. Whether they will finally cause the cotton to be sold direct from the fellah to the spinner is somewhat questionable.

#### GINNING AND PRESSING OF COTTON.

Jumel cotton used to be ginned in the old-fashioned, native way, *i.e.*, the cotton passed between two hard wooden rollers, which were turned by hand in opposite directions, and as the fibre passed through the rollers the seed was torn off and thrown backward. This primitive apparatus gave only about 12lbs. to 15lbs. of lint per 10 hours' work per day, and the long time during which the seed cotton had to be stored before it could be ginned had a serious effect on the quality. When the seed cotton was dried artificially the result was even worse.

The primitive ginning implement became gradually improved. An iron roller was turned by means of the treading of a pedal. This roller acted against a wooden roller working in opposite direction. This machine gave at the utmost 30lbs. to 40lbs. per day, but on the average not more than 15lbs. to 18lbs. lint per day.

A decided revolution was brought about by the introduction of the American roller gin of McCarthy, whose first machine was introduced into Egypt in 1853, and was able to gin in 10 hours 2 kantars of lint. This roller gin consists in the principal part of an iron roller 1 m. long, and covered with leather, which throws off the kernels of the seed cotton between a stationary metal plate in a slanting position, and a second metal plate, which moves up and down close to the former. The cotton is fed into the machine by means of an endless lattice table.

As in Egypt the small fellah produces most of the cotton, who is not in a position to buy ginning machinery, and as the large land proprietors were not inclined to establish their own ginning factories,

a special industry established itself for the ginning, consequent upon the enormous increase in the crop of 1862.

In this way ginning factories were erected, which are situated in proximity to the principal centres of cotton production. They are owned by the large export houses, by the dealers from the provincial towns, and by some limited companies, as, for instance, those of "The Associated Cotton Ginners of Egypt," which we have already mentioned. In 1908 there were in Lower Egypt 102 ginning factories, working altogether 4,110 gins; in Upper Egypt 20 factories, containing 944 gins, a single factory having from 15 to 160 gins. The average work done per annum came up to 300,000 kantars perfactory. The largest modern ginning factory is owned privately, and belongs to the well-known and highly-respected German firm of R. & O. Lindemann, of Alexandria. It is situated at Kafr-el-Zayat, and has been completely modernised three years ago. It contains 142 gins.

At the end of 1912 the total number of gins in Egypt was estimated to be 5,450. Of these 670 did not work, and of the remaining 4,780 gins, 3,746 were in Lower Egypt and 1,034 in Upper Egypt.

The factories of the present day, where steam and electricity are often combined, have two departments. In the one are situated the boiler and engine-house, the gin, and presses, and in the other the cotton stores.

The seed cotton, which arrives in large sacks, is stored in extensive yards, walled in, or in long shoonas or warehouses, which frequently have a railway line connecting with the Government Railway or the Light Railway. The cotton is there separated according to kinds. The first, second, and third pickings are always kept separately. In most cases the cotton is stored in the open, as the slight rainfall cannot damage it, owing to the close packing of the bales.

In the factory proper, the boiler, steam engine, dynamo for electrical lighting, repair shop, seed channels, and presses are usually in the lower part. The gins are situated in a large hall over it.

For the purpose of protecting the valuable fibre, the gins in Egypt are not, as is the case in the U.S.A., saw gins, but exclusively roller gins, as already described, of English manufacture, viz., Platt Bros. & Co., Ltd., who have the patent rights. This firm supplies the 40in. long single action self-feeding Macarthy roller cotton gin at about £21, including all expenses up to the ginning factory in Egypt. The leather roller has approximately from 142 revs. to 158 revs. per minute, and the knife moves about 850 to 950 times per minute. The outturn per hour is 100lbs. to 120lbs. lint, equal to 10 kantars per day of 10 hours. The knives of the gin are set by experienced men, in accordance with the length and quality of the cotton to be ginned. The leather covering of the roller must be renewed every year, and the knives require to be repaired from time to time.

The Egyptian ginning factories, with their high, light, and airy rooms, impress one usually more favourably than the American ginning factories. In some respects, however, they are not quite so practical as the latter. On account of the lower wages paid in Egypt, the ginning factories are not compelled to fit up labour-saving apparatus to the same extent as in America. Therefore, one does

not see suction apparatus, to carry the seed cotton from the yard into the ginning room; instead it is laboriously carried in sacks on the backs of men into the ginning room. Automatic mechanical feeders for each gin are not in use, and consequently it is necessary that each gin has to be fed with the seed cotton by special workmen.

I have not seen any machine guards for the protection of the workpeople.

The seed which falls off in the ginning process is taken from each individual gin through wooden channels and falls direct into the cellar, or, where there are no cellars, it is carried by special workpeople to the room, where, by means of sieves, the smaller and damaged kernels are separated, and the normal smooth seed is allowed to pass, is then collected and put direct into sacks of 1 Ardeb=120 kgs. The seed to which fibre still attaches is, however, ginned a second time, this time chiefly with saw gins, and the wasty, short-stapled product of this second ginning is separately sold as "Afritti." For every 100 roller gins there are usually two to four saw gins. If time permits, it is preferable to pass the seed also for the second time through the slower roller gins, and the product thus obtained is sold as "Scarto." However, as the saw gins run considerably quicker, these are to-day much more preferred to linter, and "Scarto" has correspondingly become less in quantity.

The seed destined for sowing, that is, "Takkawi," is taken from selected fine lots, which are ginned separately. This seed is passed through sieves and ventilated, which is not done with the ordinary seed.

On the average a large kantar of 315 rrott seed cotton gives :—  
105 rrottles Lint.

2	„	Scarto or Afritti.
198	„	sieved seed.
10	„	waste and dust.

---

315 rrottles.

---

Between the gins, which are placed in rows, wagons run on rails, and bring the ginned cotton from the ginning room to the adjoining pressing room. The cotton, which becomes heated during the ginning process, is then slightly damped with water by means of a fine hand syringe.

This watering (before pressing), which is at times repeated, is undertaken in all the ginning factories, with the exception of those belonging to the State Domains, and is effected to maintain the quality of the cotton and to obtain greater density of pressing; reasons which are open to dispute. Moreover, the cotton is also at times already artificially watered by the fellah with the intention of cheating in order to increase the weight, and it must, when this is detected, be stored for a few days before it can be ginned. The ginning factory deducts, of course, for such practices a corresponding amount. It is general use for the buyer to deduct 1 per cent. from the weight for damp and sample, but the State Domains do not allow this deduction.

*Presses.*—As far back as in 1822, primitive cotton presses were introduced into the villages; up to that time the cotton

was only firmly trodden into a bale of about 1 by  $1\frac{1}{2}$  metres in circumference. The Alexandrian exporters soon afterwards introduced hydraulic presses, which pressed the bales together even on board the ship; later on Mehemet Ali had a press sent from England, similar to those used in America, and he had similar ones constructed in Egypt, and prescribed their use in all provinces. In the fifties and sixties, before the use of steam-presses commenced, the Alexandrian exporter, Ludwig Müller, a native of Augsburg, was one of the pioneers of the rapidly progressing Egyptian cotton pressing industry.

Nowadays, in all ginning factories presses are to be met with, the majority of which are hydraulically-driven, and press the cotton, if intended for sale on the Alexandria Market, into the more voluminous, but less dense bales, known as "Alexandrian Bales," which weigh from 8 to 12 kantars, and are bound together with three to seven iron hoops. These bales are opened again in Alexandria and re-packed, or, at least, pressed again in that town.

To a smaller extent the ginning factories send out denser bales ready for export, which are steam-pressed, and weigh about 750lbs. to 760lbs. gross. Strange to say these "steam bales" are also previously pressed hydraulically, ready packed in bagging, and bound with iron hoops, and these complete bales are, 12 hours later, re-opened, in order to be finally pressed by steam and to be bound with 11 iron hoops. Perhaps it is intended that by this method a more equal distribution of the moisture inside the bales be obtained. Only the first and second pickings are pressed by steam in the provinces, whilst the third picking is usually only hydraulically pressed and sent to Alexandria in this condition.

The presses are made by Messrs. Nasmyth, Wilson, & Co., Manchester, and one hydraulic press with a pressure of one ton per square inch costs about £1,000, delivered free to destination, and including erection.

One hydraulic press presses 5 to 16 bales per hour, the steam-presses of the ginning factories of the interior press 20 bales per hour, and both are provided with revolving double boxes, one of which is filled whilst the cotton in the other is being pressed; sometimes presses have three boxes. The maximum pressure which can be utilised by the steam-presses is two tons per square inch, but usually the pressure does not exceed more than  $1\frac{3}{4}$  tons per square inch.

The prime cost of ginning and hydraulic pressing amounts to about 5 to 7 P.T. per kantar of lint, but less than 7 to 8 P.T. is seldom charged. Factories with old worn-out machinery, and without supervision by Europeans, which are obliged to attract custom by low prices, are satisfied with 6 P.T., but they make up for any loss through stealing. On the other hand, factories situated in out-of-the-way places are able to charge as much as 10 P.T. per kantar, as they have no competition to face and are protected by the high costs of transport to the distant establishments. With the normal rate of 7 P.T. a bale of  $7\frac{1}{2}$  kantars the ginning charges per bale are  $52\frac{1}{2}$  P.T., plus 32 P.T. for steam pressing, so that the total cost for the preparation of the seed cotton into a form ready for transport to the spinner is about 85 P.T. per bale. The iron hoops are

included in this figure, but the sacking has to be provided by the purchaser. All expenses of reception and delivery of the cotton are placed to the debit of the ginning factory, and the seed is returned to the owner of the cotton.

Children of 13 to 14 years working in the ginning factories receive  $2\frac{1}{2}$  P.T. to 3 P.T. wages per day of 15 to 16 working hours, including rest intervals; male workers receive a daily wage of 4 P.T. to  $5\frac{1}{2}$  P.T. During the pressure of the cotton season the factories work day and night in two shifts of 12 hours. The ginning factories also work Sundays; only keep the great festival days as holidays; commence to work in February and suspend work from April to August.

*Compresses.*—The reason why cotton does not receive its final packing at once at the first pressing is that the exporters of Alexandria wish to have the opportunity of convincing themselves at Alexandria that the whole lot is true to the sample; at times also various qualities are mixed together to produce one average at Alexandria, and for these reasons the last pressing, which on account of the sea-freight has to be as dense as possible, is given, in the majority of instances, at Alexandria by steam presses; these are superior to those used in America. The first compress was introduced by the firm of Carver Brothers & Co. about the year 1868.

To-day the whole of the pressing business is in the hands of three limited companies, viz.:—

*Société générale de pressage et de dépôts*, established 1889, which purchased the then existing presses of the firms Carver, Chorem, Peel, and the Anglo-Egyptian Bank; it has a capital of £216,000 in ordinary shares and £120,000 debentures, and possesses eight presses. A second company was established in 1892, the *Société anonyme des presses libres égyptiennes*, which works with a share capital of £70,000, plus £41,000 debentures, and with its three presses entered to a certain degree into competition with the first-mentioned firm. A third firm, the *Deutsche Baumwollpresse A. G.*, was established in 1906, with the support of the Deutsche Orientbank, with a capital of £E50,000 in ordinary shares, and £E50,000 in debentures.

These presses are all situated in the quarter of the town known as Minet-el-Bassal, which is the centre of the cotton trade of Alexandria.

The “*Deutsche Baumwollpresse*,” which pays a dividend of 7 per cent., after providing amply for depreciation, is used by the firms R. & O. Lindemann, Fritz Andres & Co., and H. Bindernagel, and each of these firms has in the plain but practically arranged buildings, which are provided with automatic sprinklers, its own mixing-room, its own staff under the supervision of its own warehouse manager, as well as its own well-lighted room on the roof for final examination and classification of the cotton recently purchased in Alexandria and of the cotton which has been delivered from the interior.

The Deutsche Orientbank also uses the *Deutsche Baumwollpresse* for the cotton held as security.

All the pressing companies possess besides large warehouses, or “Shoonas,” which have lately also been sprinklered, and are there-

fore entitled to a reduction in the Fire Insurance premium of 30 per cent.

From these Shoonas the hydraulically-pressed bales that have arrived from the interior are transferred to the pressing establishments, hoisted up to the packing-room, opened, brushed at the corners by women with brooms, and then torn asunder by men; foreign substances, such as old clothes, slippers, stones, &c., and dirty cotton are often brought to light in the process of final revision and classification, which are carried out under the supervision of a European. The cotton, loosely torn asunder, is more or less sprayed with water by a hand hose, and then thrown on sacking sheets, by native workers, who all the time march up and down in rows, singing and clapping their hands. The damped cotton, loosely bundled together, lies in the canvas sheets generally for about 24 hours before it comes to the final press. The whole of this procedure, the opening of the hydraulically-pressed bales, the final classification, and the completing of the lots, is called the "Farfara," and a set of workmen prepare in this way from 6 o'clock in the morning until 8 o'clock at night about 300 hydraulic bales. If required, these working hours are extended.

The cotton which cannot be brushed off by brooms from the corners of the hydraulic bales is picked off by hand, and cleaned in a revolving wooden beater, called the "Machinette," and is then carried on an endless cloth to the pressing-room. In this small machine various lots of ordinary (not superior) qualities of cotton are mixed up into an average quality.

It happens that the cotton is found to be too wet at the time of opening the hydraulic bales, and that a portion of it has already suffered; such spoiled cotton is thrown on one side and sold later as an inferior quality, after the whole of it has been dried for 24 hours before further treatment.

The compress is also made by Messrs. Nasmyth, Wilson, and Co., Manchester; it costs £10,000 inclusive of the steam engine used in conjunction with it, and works exceedingly smoothly, and without any noise, far better and quieter than the American monsters.

In the Egyptian final press, which can press as many as 76 bales per hour, but on an average only 55 bales, the cotton is kicked by men first into the open box press; this is then turned round under the stamp. The cotton is here so tightly pressed, first by means of steam pressure, which at the same time sets the piston in motion, and secondly by hydraulic pressure of  $1\frac{3}{4}$  to 2 tons per square inch, that one metric ton is compressed into a space of 2 cbm. By this method the Egyptian pressing, which still is slightly less dense than the pressing effected in India, becomes more compact than in America. Ships which can carry 10,000 to 12,000 bales of Egyptian cotton are only able to transport 6,000 to 8,000 bales of American cotton, although, reckoned according to weight, they ought to be able to carry 14,000 bales.

The daily wage of the native in the "Farfara" and press amount to 8 P.T.; the foreman singer receives 1 P.T. more.

After being lowered into the dispatching-room the bales are sewn together at the bottom ends, weighed and marked. *Packing* and *marking* of the bales of the Egyptian cotton are also far more care-

fully done than is generally the case with bales of American cotton, which are most slovenly treated. The bales, which are sewn up in good Indian jute canvas, and bound with 11 iron hoops, mostly of German, English, or Belgian manufacture, clearly marked on both sides, have a tare, which is of only 22lbs., the density being 36lbs. to 38lbs. per cubic foot. The button hooks, used in Egypt, for fastening the iron hoops are very practical.

The *average weight* of the Egyptian cotton bale has in the course of time materially increased; it amounted in the middle of the eighties to 666lbs., from 1895 to 1899 to 733lbs., and in 1910/11 to 760lbs.; the weight of a single bale fluctuates about 10 per cent. above and below, that is between about 695lbs. and 830lbs. gross, but in all cases have the bales the same cubic measurements.

The *measurements* of an export bale of 760lbs. are approximately 50 by 20 by 30 English inches, and 20 cubic feet, while the hydraulically-pressed "Alexandria bale" of a weight of 8 to 12 kantars measure 40 to 50 cubic feet. The measurements given in inches would represent a cubical content per bale of  $17\frac{1}{2}$  feet; as a matter of fact 20 cubic feet are taken as the contents when calculating the freight, which is explained by the fact that the cotton bulges slightly out between the bands, which causes the bales to take up more room after pressing than would be reckoned if one simply took the measurements of the press-box as a standard.

The *expenses of compressing* charged by each of the three large companies are the same, viz.,  $3\frac{1}{2}$  P.T. per kantar. To this is added 1 P.T. per kantar for the handling of the cotton from the time of the opening of the hydraulic bales to the completion of the steam-pressed bales.

#### COTTON SEED.

The cotton seed falling off during the ginning process was formerly used as fuel in Egypt, when it was not utilised for re-sowing, and also partially as forage, as the seed from which the oil has not been extracted is a very suitable food for sheep, although it should not be given to oxen as an adjunct to green food.

A great impetus occurred when, with the aid of modern science, it became possible to extract the oil and to use it as a commercial commodity; indeed, it was with Egyptian cotton seed that this discovery was made, the first trials being undertaken in the years 1841-1843, in two oil mills of Marseilles, which, however, were ruined through the experiments. The matter rested from then until the year 1851. The experiments were renewed at Marseilles, and, after lengthy studies of the problems of refining, and the use of the cotton seed oil and the profitable use of the refuse, were rewarded with success, and a growing export trade of Egyptian cotton seed to Marseilles resulted. The rapid increase of the production of Egyptian cotton caused by the American civil war led, naturally, to a corresponding increase in the export of Egyptian cotton seed, which became of great economic importance, and became the second largest produce of export after cotton itself. The continually increasing quantity brought about at times a fall in the price of 50 per cent., but the increased quantity made up the difference.

The prices of cotton seed are calculated in P.T. per ardeb of

$197\frac{3}{4}$  lbs. = 270 Rotoli = 266 lbs. English = 121 kg. During the last 30 years the following fluctuations have taken place:—

1879	1880/82	1884/87	1890	1893	1894	1900/01	1905/06	1910	1911
75	68	58	51	61	41	60	54	81	85 P.T.

To-day two-thirds of the cotton seed produced in Egypt are exported; one-sixth is used in Egypt as seed for sowing and for feeding, and the remaining one-sixth is converted into oil in Egypt. In the year 1906, for example, it is estimated that 750,000 tons of seed were produced, 500,000 tons of which were exported, and 105,000 tons converted into oil in the seven oil mills which had been erected in Egypt at that date.

Cotton seed, the same as other products, is dealt in on the Produce Exchange of Alexandria, and is quoted both for immediate delivery, "loco" or "spot," and for future delivery up to the end of August.

November/January and February/March are the chief delivery dates.

In the wholesale business the prices of the different kinds of cotton seeds are quoted without distinction, but seed emanating from Upper Egypt is valued at 2 P.T. per ardeb less than the other qualities. The quality "buona mercantile" forms the basis for the prices for future contracts, excluding seed from Upper Egypt and Fayoum; the prices are for the mechanically sieved ardeb of 270 Rottl net. The seller is permitted to deliver a quality which may be 3 per cent. lower or 2 per cent. higher than the quality stipulated, compensation being made in either case in kind. The samples of "buona mercantile" are fixed by a special commission from end of October, at the end of each month for the succeeding month. Cotton seed prices rise when the crops of olives and other cattle food crops in Europe are bad, and are, also, dependent upon the rates of the oil market at Hull.

Cotton seed accounts for 7 to 9 per cent. of the total export trade of Egypt, and shows the following development in volume:—

	Ardebs in Thousands.	Millions P.T.		Ardebs in Thousands.	Millions P.T.
1862	435	22	1901-02	3,484	204
1863	726	47	1902-03	2,973	167
1864	915	53	1903-04	2,976	156
1865	1,292	63	1904-05	2,231	162
1869	786	55	1905-06	3,244	175
1870	993	70	1906-07	3,792	239
1871	1,264	98	1907-08	3,836	250
1883-84	1,910	146	1908-09	3,532	241
1891-92	3,127	182	1909-10	2,432	193
1899-1900	3,511	196	1910-11	4,056	310
1900-01	3,016	181	1911-12	3,948	—

Regarding the countries which import cotton seed, France was obliged in the sixties to yield the first place to England, which coun-

try for a long time imported as much as 90 per cent. of the Egyptian cotton seed, the largest quantities being shipped to Hull, the centre of the English oil manufacture. Freight to Hull amounts to 12s. or 13s. per ton. In recent years England's share of the exports has been materially reduced, in the year 1910 it went down to 61 per cent., whilst Germany's share in that time increased rapidly, and placed the latter country in the second position instead of France; smaller quantities find a market in Russia, Spain, and Italy, and since 1893 increasing quantities have gone to German East Africa for the development of the cotton plantations.

Of the total exports for 1910, 3,235,000 dz. of the value of £E2,159,000 were sent to

England	2,135,000	Double Cwts. of the value of ..	£E. 1,417,000
Germany	936,000	" "	" 636,000
France	150,000	" "	" 97,000

The principal exporters of cotton seed during the season 1911/12 were

	Tons
Behrend & Co., Ltd., German .....	with 111,886
Carver Brothers & Co., English .....	" 87,412
N. E. Tamvaco, Greek .....	" 83,801
Seeger Brothers, German .....	" 64,374
J. Rolo & Co., Italian .....	" 44,204
Sundries .....	" 90,513
Total .....	482,190

The shipment of Egyptian cotton seed is made, when in large quantities, always loose. Only very seldom, and when small quantities are being dealt with, are the seeds packed in the same sacks containing 1 ardeb each in which the seed comes from the interior, or in the case of " Takkawi " seed it is sent in double sacks of  $\frac{1}{2}$  ardeb each, each empty sack being valued at 4 P.T.

#### MANUFACTURE OF COTTON SEED OIL.

The cotton seed oil industry of Egypt is comparatively new.

The oldest large cotton seed oil mill was established in Alexandria in 1889, with a capital of £70,000, under the style of *Société des Huileries et des Savonneries d'Egypte*.

It was followed in the year 1894 by the *Kafr el Zayat Cotton Company*, which possesses factories each of 30 presses in Kafr-el-Zayat and Alexandria, with a share capital of £80,000, and paid, in 1911, a dividend of 15 per cent.; and by the *Egyptian Salt and Soda Company*, established in London in 1899, with a capital of £500,000 in ordinary shares and debentures to the extent of £82,000. This firm also included the manufacture of cotton seed oil in its programme, erected a factory in Kafr-el-Zayat, the important centre of the commerce in cotton seed, bought out the old Société in Alexandria, and has in each of the two factories 32 presses. The dividend for 1911 was 6 per cent.

There are also 20 other oil and soap factories with 16 or less presses, mostly in Alexandria, a few of them being in Tantah, Damanhour, Zigazig, Cairo, Assiut, and in smaller places.

During the season 1911/12 the Alexandrian mills treated 450,000 ardebs, the mills of the interior dealing with 330,000 ardebs.

The manufacture of cotton seed oil in Egypt is usually carried on in a ridiculously secret manner, and it was only with the assistance of special recommendations that I was permitted to visit the factory of the Egyptian Salt and Soda Company in Kafr-el-Zayat.

This factory works during about  $7\frac{1}{2}$  to 9 months of the year, and deals daily with about 1,000 ardebs of cotton seed on the 32 presses, the factory working without cessation during the whole 24 hours of the day. The machinery plant has been made by Greenwood & Batley, Leeds, and the Egyptian seed, which is in good condition and fairly free from fibre, is neither cleared of fibre nor shelled, but first broken between steel rollers 48in. long and 16in. thick, then pressed between powerful stone wheels, which revolve in pairs, and finally heated in a patent steam boiler to 60° C., and during this process as little water as possible is used. The thick fluid pulp thus obtained, in which the shells remain, is run into wooden frames, which are lined with camel-hair cloth, and put in the press-boxes. Each press-stand has 16 press-boxes, measuring 14in. by 36in. Three men fill five press-boxes in 20 minutes. A pressure of 600lbs., then of 4,480lbs.—2 tons per square inch—is used in the press. After a lapse of 20 minutes the reddish crude oil has run out at the sides, the oil cakes remaining in the boxes are then taken out, their rims, which are rich in oil, are cut away and subjected a second time to the process of cooking and pressing.

This factory treated 200,000 ardebs of seed in the cotton season of 1911/12.

A "large" kantar of seed cotton of 315 Rottls contains about 204 Rottls of seed. 76 ardebs of seed are reckoned for each 100 kantars of lint, of the total weight of seed the shells represent 40 per cent. and the kernels 60 per cent. According to chemical composition, 100 kg. of seed should yield at least 20 kg. of crude oil, but, in fact, only 18 kg. to  $18\frac{1}{2}$  kg. are generally obtained. The yield fluctuates in different years, and varies by 1 kg. to  $1\frac{1}{2}$  kg., and more. In Kafr-el-Zayat the yield fluctuates, according to the years, between 18 and 20, and reached  $19\frac{1}{2}$  per cent. in 1911/12. Compared with American cotton seed Egyptian is, undoubtedly, on account of the more plentiful watering of the plantations, richer, for a ton of Egyptian seed yields about 360lbs.=48 gallons of crude oil, against 40 gallons extracted from one ton of American seed.

The crude oil which runs from the press-stands flows first into underground tanks, under the press-room, and is then pumped into storage tanks of a capacity of 50 tons each, which are placed in special warehouses.

All the Egyptian oil mills probably refine the crude oil. With respect to the process of refining, which is carried out in three stages, much greater secrecy still is practised than in the pressing. I was conducted, on my request, through the various rooms, but very hurriedly, and with as few explanations as possible. But as far as I was able to observe, the process carried out here corresponds in most respects to that practised in North America, which I have described in my article, "Cotton in the U.S.A." (see International Congress Report, Paris, 1908).

As about 5 per cent. is lost during the refining process as waste, the refined oil therefore represents only about 17 per cent. of the weight of the seed.

Beside the manufacture of yellow oil a small quantity of white "Winter oil" is made. The price of refined oil was given as £E22 per ton.

Properly refined cotton seed oil is chiefly used for eating purposes, and consumed to the extent of three-quarters of its production in Egypt. The Salt and Soda Company quoted, in autumn, 1912, for refined table oil No. 1, in tins of 4 okas, 34 P.T., for No. 2, in similar tins, 31 P.T., whilst the Kafr-el-Zayat Cotton Company sold at the same time their best winter oil at 20 P.T. for 4 okas. Whether this difference was caused through excessive competition could not be determined. Unrefined cotton seed oil for industrial purposes was at that period quoted at  $8\frac{1}{4}$  to  $8\frac{1}{2}$  P.C. per oka; consequently half the price.

Although Egypt imported, in 1910, from the U.S.A. fine cotton seed oil to the value of £E17,241, larger quantities of Egyptian cotton seed oil are exported, for example, in 1910 1,753 tons, to the value of £E22,900, of which four-fifths went to Turkey and the remainder chiefly to England, were exported.

The waste remaining after the refining process, also the refined oil, are used for soap and candle manufacture, which is carried on in Alexandria, as well as in Kafr-el-Zayatt and Zagazig on a small scale.

Oil cakes have, so far, not found a market in Egypt; for the draught cattle ordinary fodder suffices: clover, chopped straw, and broad beans; whilst fattening cattle are very seldom raised in Egypt. The production of Egyptian cakes goes almost exclusively to England, in ground-up condition, put up in cotton sacks of about 110 kg. The total exports of this product are:—

1906 : 74,000	tons of the value of	£E.238,000
1910 : 62,000	" "	283,000
1911 : 85,000	" "	355,000

As Egyptian cotton seed oil cakes, as well as those manufactured in England, contain also the husks of the seed, whilst in America the husks are separated before the cooking process, the output of oil cakes, expressed in percentages of weight, is greater in Egypt, but the oil is not so pure as that from North America.

I had an estimate for a complete oil mill with 20 press-stands, capable of treating 80 to 85 tons of seed, prepared for me by the principal suppliers of such mills; the price f.o.b. Hull was about £8,500, but the boiler and steam engine of 250 h.p. were not included in the price.

#### THE CONSUMPTION OF RAW COTTON IN EGYPT.

*Native Industry.*—The clothing of the poorer classes of the Egyptian population, with the exception of the nomads, consists almost exclusively of cotton material, which is dyed, mostly in Egypt, indigo blue. Bonaparte's scientists found that cotton-spinning and weaving, which had been practised for ages, was one of the most important industries in Egypt, and in the Delta, as well as

farther up the Nile Valley, spindles and looms were to be met with, working for domestic requirements. The necessary raw material was not grown entirely in Egypt, but was partly imported from Syria. The factories of Egypt supplied not only the domestic requirements, but exported also yarn and woven goods to Central Africa, Tunis, Algiers, and the Christian countries of the Mediterranean Sea, but none to Syria or Asia Minor, which made their own goods.

It was Mohammed Ali's aim to introduce the modern *factory-industry* into Egypt, on the basis of a States monopoly; according to this the trades concerned had to work solely for the State, which supplied them with the raw material, and they had to furnish to the government stores a fixed quantity of finished goods at a previously determined price, but this was always an extraordinarily low one.

A first silk-spinning mill was erected in Cairo in 1816, with the help of workers from Florence, and this mill was re-modelled, after the discovery of Jumel cotton, into a *cotton-spinning and weaving mill*. Shortly after the second cotton-spinning and weaving mill, called the "Malta" mill, was established in Cairo-Bulak, under the management of Jumel himself. This mill wove all kinds of cloth, from the coarsest to the very finest muslins, and it was followed until 1830 by about 24 other mills, which had been erected in the Delta and in Central and Upper Egypt, so that the number of pieces of cotton goods delivered annually to the monopoly-depôt amounted to about two millions. Then Mohammed Ali commenced to have even the necessary machinery made in Egypt, instead of buying it from Europe, as at first; the motive power was supplied partly by steam engines and partly by oxen, and over 30,000 workmen were engaged in the various modern factories.

This artistically built-up industry, however, soon declined. The fellah proved to be quite unsuitable for factory work, and the monopoly system had the natural effect that all competition ceased, the productions became continually worse, because the workers, who never received a higher wage than the one fixed, had no stimulus; besides, the Government management proved to be incompetent, corrupt, and costly, so that the imported English cotton goods, which only paid 3 per cent. duty, came into Egypt at about 20 to 30 per cent. less than the cost price of the Egyptian goods, and thus, even before the death of Mohammed Ali, this monopoly-industry came to ruin.

The ancient hand-loom cotton industry, which had, meanwhile, been oppressed by the State monopoly, however, never recovered its former position, although it again gradually developed and the Census of 1907 showed the number of weavers to be 39,000. These are spread all over the more important places of Lower Egypt; they supply mainly the ordinary local consumption, and weave on their hand-looms cheap yarn up to No. 40's, which has mostly been imported from abroad, three-quarters of it coming from England and East India. The Egyptian cotton, generally spun by the village spinners, comes principally from the very last picking, and is of quite an inferior fibre. The cotton-weaving in Assiut and Girgeh supply two kinds of Galabieh material for the gowns of the native population, and in various places, for example, in Mehallet-el-Kebir,

beautiful artistic weaving is still carried on. Several thousands of weavers, who, about the beginning of the new century, came to Egypt from Northern Syria on account of unsatisfactory conditions there, are said to cover, to-day, the whole of the demand of Egypt and the Sudan in silk and union Aladsha material, which represents an annual value of £150,000 to £200,000. A technical school at Abutig near Assiut is endeavouring to train a nucleus of competent weavers.

Hand in hand with the weaving establishments, and often belonging to the same owners, are the dye-works, these are also carried on on a small scale; the red and black colours are produced mostly in the country, aniline colours and indigo are chiefly imported from Germany, whilst a certain quantity of native indigo is still imported from India.

Towards the end of the 19th century fresh experiments were made in Egypt with cotton-spinning and weaving factories, driven by power.

The *Société Anonyme égyptienne pour la filature et le tissage du coton* was founded in 1895 in Cairo, but never commenced to work, and the following two factories, which were founded in 1899, and supported by London and Liverpool capital, did not meet with good results.

The *Egyptian Cotton Mills* of Cairo, with a capital of £160,000, 20,000 spindles and 360 looms, liquidated in the year 1907, and the machines were sold and sent to Aleppo.

The *Anglo-Egyptian Spinning and Weaving Company* of Alexandria, with a capital of £150,000, and 20,000 spindles and 500 looms, never paid a dividend.

In 1912, the latter English factory has been refloated by German merchants of Alexandria, such as R. & O. Lindemann, Schneider, and others. The old shares were reduced to 25 per cent. of their nominal value, and the capital was raised to £50,000 by a further payment of £12,500. This mill, which is now known as the *Filature Nationale d'Egypte*, is managed by capable Germans, who possess commercial and technical experience, and has even in the first year been very successful, which is to some extent, no doubt, due to the Turkish-Italian War, which has excluded Italian competition in Turkey through the doubling of the tariffs.

The factory uses mainly cheap Upper Egyptian cotton, of which about 25,000 kantars were consumed in the cotton year of 1911/12, along with a very small quantity of Indian cotton, and spins from 16's to 20's, and a little quantity up to 30's. About 20 per cent. of its yarn production are sold to the Egyptian hand-loom weavers, but 80 per cent. is woven in the factory into plain shirtings, such as are in demand by the ordinary indigo dyers of the district; they subsequently find a market in Turkey and in Egypt.

The excise duty of 8 per cent. imposed in 1901 on the value of the cotton goods made in Egypt as compensation for the import duty, has been suspended in 1909 for a term of five years in accordance with a Government agreement.

The old spinning machinery and the looms of the factory were made by Messrs. Platt Brothers & Co., Oldham; some new German machines have been added.

The 600 operatives employed here, of whom many are women and children, are mostly natives, but there are a few Greeks and Italians amongst them. Their weekly wage, for 11 hours daily work, is on the average of the various nationalities from 55 P.T. to 70 P.T.

The wages for the weaving are paid on piece work; the average outturn is much lower than in Europe, as one operative looks only after two to four narrow looms.

The reason why the cotton spinning and weaving industry of Egypt has not prospered under normal conditions is to be found in the fact that Egypt is not at all a country suitable for modern industry. The natives are agriculturalists and dealers, but no mill workers. The Arabs are, it is true, frugal and well-disciplined, but they are untidy, dirty, and do not possess any understanding for complicated machinery. Besides the lack of adequate labour, there is also a scarcity of fuel; best Cardiff coal was quoted in November, 1912, 34s. franco wagon Alexandria. Another reason is that Egyptian capital is preferably invested in land speculation, and not in industrial undertakings. Strikes are also known in Egypt, but they have so far only been very small and without result.

*Importation of cotton goods.*—Egypt is therefore compelled to rely upon the importation of woven cotton goods, and England supplies about 85 per cent. of these. In 1911 cotton goods to the value of £E4,125,000 were imported, of these £E3,411,000 came from England, the rest was imported from Italy, Austria, Germany, and France. The principal goods imported from England are grey cloth, grey shirtings, madapolams, and prints. Hosiery is imported principally from Germany, but England, France, and Italy also supply some, the latter country especially the cheaper qualities. Cotton yarn was imported during 1911 to the value of £E323,000; of this amount £E149,000 came from England, the rest mostly from East India.

#### COTTON EXPORT.

As Egypt does not possess a cotton-spinning industry of any importance, the major portion of the Egyptian cotton crop is sent abroad, and raw cotton is to-day by far the most important item in the list of exports. The exports of cotton have developed in the following manner:—

1832	1836	1839	1860	1863	1864	1865	1871	1884	1895	1906/10
30	58	35	28	78	90	91	72	67	74	82½%

of the total trade.

The Egyptian cotton, with a staple length of 30 mm. to 45 mm. (whilst American Upland has 20 mm. to 26 mm., Sea Island 40 mm. to 60 mm.), is especially suitable for sewing thread, fine under-wear, hosiery, laces, and all kinds of cotton goods with a smooth surface and a fine lustre. For this reason Egyptian cotton is largely employed in weaving along with silk. It is more suitable for this purpose than American Upland, and is not as expensive as Sea Island. Egyptian cotton is also largely employed for goods which require mercerising. Its brown colour makes it adaptable without the necessity of dyeing for all kinds of "écrù" textures,

such as curtains and hosiery. Egyptian cotton takes the dye exceedingly well. During the last few years a very large use of Egyptian cotton has been made in the manufacture of covers of motor tyres, and it is also largely employed in covering electrical wires.

In 1911 there were in existence about 139 million spindles, and of these about 21,190,000 were employed in the spinning of Egyptian cotton. It is generally estimated that 100lbs. of Egyptian cotton will produce 65lbs. of combed yarn and 85lbs. to 90lbs. of carded yarn.

Almost the entire exportation of Egypt is taken via Alexandria. Port Said is endeavouring, during the last few years, to draw a portion of the export trade via the canals of the "Mensaleh Canal and Shipping Company" from the hinterland, but so far the turnover of Port Said is not very important, and of still smaller value are the exports made to the East, via Suez. This place cannot compete in exports to the west with Port Said, on account of the high charges levied by the Suez Canal Company. Alexandria is the seat of the large export firms, of the chief administration of customs, of the Produce Exchange, the General Produce Association, and of six Chambers of Commerce belonging to different nationalities (French, English, Italian, Austrian, Greek, and Russian). In 1903 the International Chamber of Commerce was established in Cairo, which deals with questions of general interest to commerce, industry, and transport, but it cannot be said that this body is an important one.

The principal export houses of Alexandria are the following :—

Export-Season 1911/12  
in Bales,

Choremi, Benachi & Co. ....	Greek .....	140,141
Carver Brothers & Co. ....	English .....	128,343
R. & O. Lindemann ....	German .....	108,564
Peel & Co. ....	English .....	107,602
J. Planta & Co. ....	Swiss .....	57,086
G. Frauger & Co. ....	French .....	53,837
Fritz Andres & Co. ....	German .....	45,995
Mohr & Fenderl ....	Austrian .....	42,293
G. Pilavachi Fils ....	Greek .....	37,841
Reinhart & Co. ....	Swiss .....	30,661
E. Mallison & Co. ....	Russian .....	29,762
H. Bindernagel ....	German .....	26,397
Andritsakis, Barsoum, & Co. ....	Greek .....	19,872
Hahnloser & Co. ....	Swiss .....	18,943
Geo. Riecken ....	Austrian .....	15,134
W. Getty & Co. ....	Swiss .....	14,448
J. M. Mezger ....	English .....	10,292
N. G. Casulli ....	Greek .....	10,107
Barki, Behor & Co. ....	Arabic .....	8,217
Moursi Brothers ....	Arabic .....	7,787
Seeger Brothers & Co. ....	German .....	7,486
N. Huri & Co. ....	Syrian .....	7,437
Sundries ....		36,939

The large cotton export firms are, as will be seen from the list, in foreign hands, and consequently the profit of their business undertakings, will, to a large extent, go abroad, although it must not be forgotten that during the last few decades the large ginning factories, presses, &c., have been created almost entirely with the capital of these large exporting firms.

Amongst the 23 firms mentioned, seven are in the hands of Germans, or enjoy German protection, and their exports during 1911/12 amounted to 30 per cent. of the cotton shipped from Alexandria.

Some exporters buy *direct* from the *planter*, gin his seed cotton for their own account, and press the lint at the ginning station into proper export bales, in order to enable the cotton to be shipped direct from the ginning station.

Mostly, however, the exporters buy ginned cotton in the market of Alexandria, to which planters, ginners, and dealers send the cotton from the interior. The cotton which is offered in the market is stored in warehouses of commission agents, banks, &c., whilst the cotton which is stored in the presses is already owned by the exporters, and is not sold in the market at Alexandria. On the basis of samples submitted by the brokers to the exporters, the cotton which is stored in the warehouses of the commission agents, bankers, &c., is sold, the brokerage being  $\frac{1}{8}$  to  $\frac{1}{4}$  per cent.

The exporter has his own house in Europe, and agents in the cotton districts of Europe and America. The spinning mills have no buyers of their own in Alexandria.

The *price* of Egyptian cotton is fixed in Alexandria in the following manner :—

Egypt has been coining money on its own basis since 1834, it has accepted the metric system for all administrative purposes since 1875; in 1885 the present coinage of £E1 = 100 P.T. at 10 Millièmes was introduced, and in 1892 the metric system was generally accepted. Nevertheless, at the Produce Exchange in Alexandria business is still transacted according to the old coinage, weights, and measures, viz., the old Marie Therese dollar or "Talleri," which are being coined by Austria at a great profit. The coins bear the year 1787, and have been appreciated in Egypt and many countries of the East, on account of their high silver percentage; up to 1885 the Marie Therese dollar was the most favoured coin. The Alexandria Produce Exchange still uses the kantar of 44.928 kg. at 100 Rottls, and ardebs of 197 $\frac{3}{4}$  Litres. To-day the Egyptian 20 P.T. piece is called "Talleri" in the Egyptian cotton trade. In calculations we still meet with a sub-division of the P.T. into the old 40 paras.

The quotations of cotton in Alexandria are given per kantar in Talleri and 32nds of Talleri, and in quoting the different qualities as Mitafifi, &c., are further sub-divided into grades. These official grades are: Mit Afifi, Ashmouni, and Asili are divided into fair, fully fair, good fair, fully good fair, and good; Abbassi, Joanovitch, Nubari, and Sakellaridis into good fair, fully good fair, good and extra.

Besides these classifications, each Alexandrian firm has its own private sub-divisions, sometimes under fancy names of no meaning,

and sometimes the spinners make up special types, suitable for their own requirements, which the exporters must match. Some of the price lists show as many as 100 different classes, amongst these as many as 30 different kinds of Afifi. The Egyptian cotton business is, contrary to the American "bulk" cotton trade (in which only Sea Island takes up a special division), quite a specialised trade, which must conform to the most varied requirements, and for this reason also it is difficult to get cotton ready for export in the interior.

Egyptian cotton is not sold according to length of staple, as is the case with American cotton, but most of the Egyptian cotton is sold with a view to lustre, fineness, colour, strength, and lack of dead cotton.

The basis of quotation on which future business is transacted is that of "fully good fair brown Mit Afifi." Cotton from Upper Egypt is somewhat lower in price, Abbassi, Nubari, Joanovitch, and Sakellaridis are about 1 to 4 dollars per kantar higher.

The average prices of Egyptian cotton are, on account of the longer length of fibre, the fineness, and the lustrous colour, higher than those of American Upland, but, nevertheless, the fluctuations of the Liverpool market for American cotton influence to a certain extent the basis of quotations for Egyptian cotton in Alexandria; when the price of Egyptian cotton becomes too high, it is frequently, as far as possible, substituted by American kinds, and thus the price of American cotton acts as a regulator.

The quotations in Alexandria are for "spot" cotton, i.e., cotton to be obtained at once, or for "future deliveries" within 12 months; the latter refer frequently only to difference transactions.

In 1884 the *Société Egyptienne de la Bourse Commerciale de Minet-el-Bassal* was established with a capital of £35,000. It cannot be called an exchange proper, but is really a building that has been erected by a company for the purpose of having in one place a number of small and large offices let to parties interested in cotton, such as exporters, dealers, &c. There are no special rules for the so-called commercial exchange of Minet-el-Bassal, or onion harbour, which is a quarter in the south-west part of Alexandria, where are also situated the cotton stores (Shoonas) of the dealers and bankers, and the presses. In Minet-el-Bassal are the goods station of the State railways, the landing stage for disembarking the produce coming from the interior on the Mahmoodije Canal, and the quays where the steamers take cargo for export. Thus the entire handling of cotton is carried on here. On the basis of samples, cotton is sold at Minet-el-Bassal as well as cotton seed, grains, and produce, and from 11-30 a.m. to 1-30 p.m. one sees in the yard of the market all kinds of people, wearing different coloured costumes, and speaking all kinds of languages. Farmers, as well as brokers, submit to exporters in their small offices samples of the cotton they have to sell. These samples have frequently been valued beforehand by official experts. If the cotton offered suits the exporter he will order new samples to be taken from the cotton, and on the basis of these the price is definitely fixed. After the closing of the market the buyer has the bales which he has bought marked, and then again further samples are taken. The seller then draws at once for the approximate amount of the transaction on the

buyer, who must take possession of the cotton within two days, otherwise storage is charged; the final settling-up is made after the exact amount of the tare has been ascertained.

Banks also sell cotton on which they have made advances, and their transactions are also made in the same manner as just described. The cotton which has been grown on the State Domains is sold by public auction in Minet-el-Bassal to the highest bidder.

The *conditions of sale* for "spot" cotton in Alexandria correspond almost entirely to the rules of the Minet-el-Bassal Exchange, i.e., the prices are for net weight less tare and 1 per cent. for damp and samples and all shipping expenses, including the export duty of 1 per cent. *ad valorem* (the values are fixed monthly), the 2 per 1,000 quay dues, and half of the pavement taxes, which come to  $\frac{1}{2}$  per 1,000, are for the account of the exporter.

Only a very small fraction of the crop is sold on the Daira conditions, which are about 4 per cent. less favourable; under these the buyer pays the brokerage and the shipping expenses, but the tare and 1 per cent. for damp are not deducted.

The real exchange is the *Société Anonyme de la Bourse Khédiviale d'Alexandrie*, which was established in 1883, and reorganised in 1909; its capital is £60,000. It has a concession from the State and is supervised by it. It comprises the Share and Stock Exchange and the Produce Exchange, where listed shares can be dealt with, and even transactions for differences are admissible. The Produce Exchange is under the management of a board, consisting of brokers, merchants, and bankers, who daily fix the official quotations and publishes them. There is also a disciplinary council, a court of arbitration, and a clearing house for the payment of differences. The hours of the Exchange are: From November to April, 9-30 to 1-15, and 5-15 to 6-15; from May to October, 9-30 to 1-15.

"Future" business in cotton has been transacted in Alexandria as far back as 1861, in New York since 1870, in Liverpool since 1873, and New Orleans since 1880; Alexandria is therefore the oldest future market, and futures in cotton are dealt with on the Exchange in Alexandria only for the months of November, January, March, May, July, and August. Future transactions are liquidated twice every month, on certain days, which are made known at the beginning of the year, and the board of the Exchange fixes the rates of liquidation which form the basis for the payment of differences where the cotton is not actually taken up. These payments have to be made within three days. When the difference in price amounts to as much as  $12\frac{1}{2}$  P.T. per kantar of cotton, and 5 P.T. on the ardeb of cotton seed, the board of the Exchange has a right to fix additional liquidation days.

In all future transactions the broker must make out for each contract a form in duplicate, of which the one, that the buyer receives, must be signed by the seller and the other, which the seller receives, must be signed by the buyer. The broker receives duplicates signed by each of the parties to the contract. As a matter of fact only the name of the broker is frequently mentioned, as long as his financial position and standing may be considered sufficient guarantee. Each contract-form ought to contain the number of the contract, the names of the two parties, the quantity of kantars bought, the description of the quality, the price of the cotton, and

the time and place of delivery. The contracting parties are, through the contract, subject to the rules of the Produce Exchange and of the General Produce Association, and bind themselves to submit to arbitration by experts of the board of the General Produce Association in all cases of differences arising out of the contract. The buyer and seller each pay  $\frac{1}{4}$  per cent. as commission to the broker.

Endorsed contracts are dealt with on the Exchange just as any other share certificate; they are called out publicly by the brokers, and the owner changes often and repeatedly.

The contracts are made out in the French language. Although the English have occupied Egypt for more than 30 years, the international commercial language, and the language of the best society in Alexandria and Cairo, is still *French*.

Speculation is also active as regards *premium* transactions and the fixing of the rates of premium for "Simple faculté," "stellage," and "doublé" is made at the end of the month.

The brokers engage a number of agents whose reputation is not always the best. They are called "Remisiers," and their duties are to bring to their employers, against payment of a commission, customers from the interior.

Of very great influence is the *Alexandria General Produce Association*, which was established in 1883, an Association comprising the most important export firms; it has established rules for the trade of produce and fixes the different grades of the various kinds, controls the arrivals, shipments, and market prices, publishes weekly bulletins with regard to these matters, and acts as a court of arbitration.

This Association has a special sub-division for cotton, another for cotton-seed, grains, and leguminous crops. The committee of this Association fixes the standard types which serve as a basis for transactions in cotton. These are kept at the offices of the Association in Minet-el-Bassal, and, if necessary, during December of each year these types are altered for the coming season.

The General Produce Association publishes every Friday the official prices and the actual cotton transactions which have taken place in Minet-el-Bassal. Some firms publish these daily, but the official figures are given only once a week.

In "future" transactions in cotton the minimum quantity of 250 kantars, net, is taken as a basis of the contract, and also multiples of this figure, say, 500, 750, 1,000, &c. The following principal conditions, fixed by the Alexandria General Produce Association, are in use. The quotation is made loco Alexandria in "Talleri" for 100 Rottls = 1 kantar net weight, less packing, which is charged to the seller. "Fully good fair" forms the basis for all "future" business, but any other classes between "good fair" and "good" may be delivered against a corresponding compensation, this being determined for every delivery month by the Committee of the Association jointly with the Committee of the Produce brokers. The seller has, however, not the right to offer cotton of a grade inferior to "good fair," and grades superior to "good" may be tendered, but will only be accepted at the price of "good." Against contracts in Mit Afifi, Nubari may be tendered as a substitute at the same price. On the contrary, against contracts for delivery of Mit Afifi, cotton

from Upper Egypt, including Fayoum, is only to be substituted on a reduction of price, which is fixed by the Committee of the Association, jointly with the Committee of the Produce brokers, within the last three days of each month, and which is in force for the succeeding month. If the contract refers to Upper Egyptian cotton, the corresponding class of Mit Afifi may be supplied, but without any right to indemnity. Sudan cotton is, since the season 1912/13, deliverable under contracts for other cotton, but the Committee of the Association reserves to itself the right to grant a reduction of price to the buyer. The cotton must be hydraulically pressed, if it is steam pressed, the expenses of pressing cannot be claimed, and a penalty of 10 P.T. per kantar is imposed in addition. Several of these conditions are subject to changes from time to time.

Cotton sold under "future" contract must be placed at the disposal of the purchaser in the month stipulated within a latitude from the 1st to the 22nd, and the seller is entitled to deliver each lot of 250 kantars in two different kinds of cotton which are tenderable. The bales taken over by the buyer are at once marked by him, and payment follows on the dates agreed upon for each week, which are published at the beginning of the year. The goods in question must be taken over by the 10th of the next month at the latest, if this date is exceeded the buyer has to pay storage rent and fire insurance, each amounting to 1 P.T. per day per kantar.

Each contract is regarded as terminated on the delivery of the warehouse certificate for the cotton sold. If the delivery of the cotton has not been effected before the 22nd of the month, the buyer has the right to apply to the Committee of the Produce Exchange, and through their medium to have the lot of cotton in question purchased for the account, and at the risk of the seller. Both parties have also the right, in case the difference arising from the transaction is not duly paid, to liquidate the transaction through the medium of the Committee of the Produce Exchange.

Arbitration on cotton delivered is more often the rule than the exception.

All differences of opinion arising at the time of delivery are, as already mentioned, finally settled by the Committee of the General Produce Association.

Under the term "free station," future transactions are also concluded in Minet-el-Bassal; these, however, have strict reference to a mostly shorter and definitely stipulated period and to the quality and class to be delivered, contrary to the usual "future" transactions, and these contracts therefore form no article of commerce.

"Future" transactions in Egyptian cotton can only be dealt, besides in Alexandria, on the Liverpool market, the standard there also being "fully good fair brown," and the quotations being in pence and  $\frac{1}{100}$  of a penny per English pound, delivery in Liverpool; on the Continent of Europe there are no "future" Exchanges for Egyptian cotton, and for arbitrations Liverpool is the only European market; it is the only town where stocks of Egyptian cotton are held, among which are large consignments, especially from Greek firms in Alexandria. These cotton consignments coming into Liverpool embrace all varieties, but they amount altogether only to about

5 per cent. of the total exports, and have no appreciable influence on the fixing of the prices.

German spinners have, up to the present, been also obliged to make use of the Liverpool *arbitration*, and in some few cases, have samples drawn from every fifth bale on arrival of the cotton at the European port. It is admitted that the arbitration proceedings of Liverpool are generally reliable, and up to the present are preferable to arbitrations taking place at Bremen, because by far more Egyptian cotton is dealt with in Liverpool, and therefore there are more competent experts at hand there than in Bremen, which does not possess any special classifier for Egyptian cotton. Nevertheless, one must agree that an arbitration in Bremen would be absolutely impartial, because there the classifier is the paid official of the Cotton Exchange, and at the time of arbitrating he does not know the names of the parties concerned in the arbitration, whilst in Liverpool the arbitrators are appointed by the vendor and purchaser and act as representatives of their respective parties, and the victory is carried off by the one who displays the greater cleverness, just as in most of the law-suits.

The conditions of the Bremen Cotton Exchange are, except for arbitration, valid for the contracts in Egyptian cotton for German spinners.

The seller in Alexandria covers himself in his sales under future contracts, generally by purchasing from a broker corresponding counter contracts on the Alexandria Produce Exchange, in order to avoid risk arising from these transactions, which is very considerable.

As Egypt is connected with the world's cables at Alexandria, Port Said and Suez by the Eastern Telegraph Company, the quotations for Egyptian cotton are telegraphed daily to the persons interested.

The quotations are sent to Europe both for prompt delivery and for delivery during later months, inclusive of contracts for the next harvest, either f.o.b., that is free on board at Alexandria, in Pfennigs for  $\frac{1}{2}$  kg., in francs for 50 kg., and in pence for one English lb.; or to Austria and to the countries purchasing cotton via Austria, free on wagon at Trieste with an addition in price of 1 Pfennig per lb.; or, finally, c.i.f., that is, including cost, insurance, and freight, with the following additions to the Alexandria f.o.b. price: for Hamburg  $1\frac{1}{4}$  Pfennig, Liverpool  $\frac{1}{4}$ d., Hull and Odessa  $\frac{3}{2}$ d., St. Petersburg  $\frac{5}{2}$ d., Marseilles, Genoa, Venice, and Naples 1 franc, Antwerp  $1\frac{1}{4}$  fr., Dunkirk, Havre, and Barcelona  $1\frac{1}{2}$  fr. more.

The exact rate for conversion of a kantar into kg. is 44·928, and in English lbs. 99·049,223. It is customary, however, when invoicing in foreign weights—of course, taking into account in the calculation of the price—to give an advantage to the spinners by reckoning the kantar equal to 44·5 kg. or 98·25lbs.

The exporters claim from their customers a latitude or franchise of  $\frac{1}{2}$  per cent. on the gross loading weight, compared to the gross invoice weight.

The value of the invoice is, as far as Continental spinners are concerned, covered by three months' drafts, or even 6 months', on Europe on bank credits; only transactions with England,

America, and the larger part of the business with France is paid for by direct drafts on the spinners, or their accounts are paid within 10 days from receipt of the goods.

For negotiating the drafts drawn in Alexandria, and for the general banking business, there are a large number of local banks and branch houses of foreign banks in existence. Almost all these institutions have a special department for the business in cotton and act "nolens volens" as storehouses for the products of the country stored with them as securities; some of them have warehouses even in the interior, in which they have the goods stored under their own control that are placed with them as security on loans.

The banks established especially for Egypt and the neighbouring countries are :—

	Head Office.	Established.	Capital.
Anglo-Egyptian Bank .....	London	1864	£ 1,500,000
National Bank of Egypt ..	Cairo	*1887	£ †500,000
Comptoir financier et commercial d'Egypte .....	Alexandria	1898	£ 3,000,000
Société Générale Egyptienne pour l'Agriculture et le Commerce.....	Antwerp & Cairo	1905	£ 300,000
Crédit franco-égyptien .....	Paris	1905	15,000,000 Frcs.
Bank of Abyssinia .....	Cairo	1905	12,500,000 „
Banque égyptienne de Commerce .....	Cairo	1908	£ 500,000
Cassa di Sconto i di Risparmio	Alexandria	*1909	£ 100,000
			10,000,000 Frcs.

\*Reconstructed.      †Paid up.

The following European banks have branches in Egypt :—

	Head Office.	Established.	Capital.
Banque Imperiale Ottomane	Constantinople	1863	250,000,000 Frcs.
Banque Nationale de Grèce..	Athens	1893	50,000,000 Drachems
Banque d'Athènes.....	Athens	1894	60,000,000 „
Banque d'Orient .....	Athens	1904	25,000,000 Frcs.
Jonian Bank .....	Athens & London	1839	£485,000
Comptoir National d'Escompte .....	Paris	1848	200,000,000 Frcs.
Crédit Lyonnais .....	Paris	1863	250,000,000 „
Banco di Roma .....	Rome	1892	200,000,000 Lire
Banque Sino-Belge .....	Brussels	1909	15,000,000 Frcs.
Deutsche Orientbank .....	Berlin	1906	32,000,000 Marks

The latter, established by a group of German banks, under the direction of the Dresdner Bank, possesses subsidiary branches in Egypt at Alexandria, Cairo, Damanhour, Mansourah, Minieh, Tantah, and Beni-Suef, and agencies in Port Said and Suez. In spite of its short existence the Deutsche Orientbank in Egypt has, thanks to able management, already a very honourable position and has built up a large connection, especially amongst the rich native landlords.

The many Banks and credit institutions which have in the course of the last few years become established in Egypt work mostly with resources placed at their disposal by their European head offices; the native population has not yet become accustomed, partly due to the Mohammedan prohibition of lending money at interest, to place its superfluous capital entirely with the banks, and therefore the development of Egypt and of its great trade is very much dependent upon European credit. Competition between the individual institutions is very keen, and the fact that the effects of the financial crisis of 1907 have not yet been overcome is seen by the great failures of 1911 and 1912, one of which was the old Bank of Egypt.

The usual minimum rate of interest of these commercial banks is 6 per cent., the legal rate of interest in Egypt is 9 per cent. per annum.

The *shipments of cotton* from Egypt commence in September with about 2 to 4 per cent. of the total exports, increase then rapidly up to December, during which about 20 per cent. have to be exported, maintain a good percentage up to March, when they decrease gradually to the time of the beginning of the new crop. The official Egyptian cotton year is from the beginning of September to the end of August; some statistics are made up according to this period, others follow the calendar year, which fact should be remembered when making comparisons.

The large and only lightly-pressed cotton bales, which have been pressed in the ginning factories, and bought from the brokers, are opened before shipment, the cotton is exposed to the air, defective parts are sorted out, and the cotton, after having been sprayed with water, is loosely wrapped in this condition into sacking for 24 hours, in order to allow the water to thoroughly penetrate before the bales are pressed with the giant compresses, which in place of the large-bales weighing from 8 to 12 kantars, and occupying a space of 40 to 50 cubic feet, turn out small bales of a weight of 7 to 8 kantars, and of 20 cubic feet measurement.

*Damp in Cotton.*—Watering of cotton at the time of pressing seems to be carried out in good faith by the exporters of Alexandria, but has, naturally, given rise to protests on the part of the spinners. The demand made in the year 1911 by a spinning firm of Saxony, that Egyptian cotton should not contain more than  $8\frac{1}{2}$  per cent. of damp of its weight, was, however, unanimously rejected by the members of the Alexandria General Produce Association, and it was decided by them to impose a penalty of £500 for each single case if any exporter should sell cotton with a clause referring to damp or dryness.

It is generally assumed in the trade that cotton, normally, whether from North or South America, East or West India, Egypt, or elsewhere from Africa, contains  $8\frac{1}{2}$  per cent. moisture, i.e., that 100 parts dry-weight have  $8\frac{1}{2}$  per cent. of moisture, or that 7.834 parts moisture come on each 92.166 dry-weight. As a matter of fact, the natural moisture of cotton certainly varies according to the atmospheric conditions. But on the ground of the approximately correct and

conventional acceptance of  $8\frac{1}{2}$  per cent. most of the continental spinners sell their cotton yarn with the guarantee of this maximum amount of moisture, and it is therefore a question of vital importance to the spinners that the amount of the moisture in the raw cotton does not exceed this percentage.

We have already seen that artificial watering of Egyptian cotton is often done by the fellah, and a further addition is made by the ginning factories, and again in the final pressing at Alexandria, quite openly, so that Egyptian cotton is often exported which contains from 6 to 15 per cent. of moisture.

The exporters maintain in defence of this practice, after many years of experience, that cotton in a state of absolute dryness is brittle and causes an extraordinarily high percentage of bursting of the bale hoops, which necessitates re-pressing and additional expenses. It is also said that the quality is favourably influenced by damping, as the staple becomes longer and more supple than the staple of cotton which is quite dry. Of course, it is said the water which is added is calculated and is considered in the fixing of the price; the exporters further state that as a matter of fact Egyptian cotton does not contain, on the average, more than  $8\frac{1}{2}$  per cent. of moisture.

Spinners, on the contrary, say that damping the cotton injures the quality and colour of the cotton fibre, makes the cotton stick together in an undesirable manner, and become mouldy if kept for a long time in European warehouses; further, that unnecessary freight has to be paid on the superfluous moisture.

In defence of their interests, spinners are striving to obtain the scientific establishment of a standard of moisture in cotton as a basis for indemnities for excessive moisture, and are endeavouring to introduce this standard into the contracts. Just as the sellers guarantee the class, staple, tare, &c., subject to arbitration in case of differences of opinion, they should, the spinners maintain, also guarantee a maximum amount of moisture. The Cotton Exchanges of Liverpool, Bremen, and Havre have so far remained passive in response to the demands of the spinners, and the same applies to the Alexandria General Produce Association. But the recent agitation on the part of the spinners seems to have had some effect. Several lots of Egyptian cotton in 1910 contained over 13 per cent. of moisture, whilst at the present time 10 per cent. is seldom exceeded, and the percentage fluctuates between 7 and 11 per cent.

The practice of the spinners of conditioning each separate lot is becoming more and more prevalent, *i.e.*, they ascertain the exact contents of moisture either in their own factory or in the nearest public conditioning establishment, according to the conditions of the International Federation of Master Cotton Spinners' and Manufacturers' Associations. The cotton is heated to  $105^{\circ}$  C. or  $110^{\circ}$  C. The figures mentioned previously serve as a standard. It has been suggested at the last International Cotton Congress that a public conditioning establishment should be erected at Alexandria.

That abuses occur through the artificial watering of cotton has been acknowledged in private conversation by individual exporters

at the time of the International Cotton Congress in Egypt, although not publicly, and that it is possible to pack the cotton well, even without damage to the quality, without any artificial watering at all, is proved by the example of the States Domains.

The reason why the bales (about 85 per cent. of the total) are not completely finished for export at the time of the first pressing has already been given in the paragraph referring to pressing. Only when the Alexandria house, after long business connections with the seller, has satisfied itself as to the reliability of the seller, does it buy the bales ready made up and pressed for export. Generally, the steam-pressed bales entering Alexandria have been already sold direct to Europe in the ginning factories.

The steamship companies accept only tightly-pressed bales, and the following rates of freight were charged for cotton from Alexandria during the season 1912/13. to :—

Trieste (franco waggon) .....	Fr. 2.20	per 100 kg.
Genoa and Venice .....	2.00	"
Marseilles .....	2.00	"
Barcelona .....	3.30	"
Oporto via Liverpool .....	26/6	per ton measurement of 40 cub. ft.
Havre .....	Fr. 3.85	per 100 kg.
Dunkirk .....	3.24	"
Rotterdam .....	20/6	per ton of 1,000 kg.
Hamburg .....	22/-	"
Stettin via Liverpool .....	23/-	" measurement.
Riga via Liverpool .....	21/-	" "
St. Petersburg via Liverpool .....	20/6	" "
Odessa.....	Fr. 1.80	per 100 kg.
Liverpool and Manchester .....	12/-	per ton measurement.
Boston, New York, and Philadelphia .....	19/6	"
Kobe, Yokohama .....	35/-	" 1,000 kg. "
Osaka .....	40/6	" "

Almost all the countries which carry on cotton spinning import Egyptian cotton. At the time of the reign of Mohammed Ali France and England were the chief importers of about an equal quantity of cotton, Trieste followed, and at times took more; importations of much less quantities were made by Livorno and Genoa. England, on account of the rapid development of her cotton industry, especially since the American Civil War, has taken more and more a pre-eminent position and imported in the year 1870 about 80 per cent. of the total Egyptian cotton harvest. Since that time, however, the imports to England have decreased to a figure below half of the total exports from Egypt (1898, 43½ per cent.; 1912, 46 per cent.), whilst the U.S.A., Russia, and Japan have appeared on the market as new customers. This extension of the circle of importers is of material significance for Egypt, as its export market has thereby become independent of the prosperity or adversity of any one individual seat of industry.

The second largest importers of Egyptian cotton to-day are the U.S.A., which, since 1889, have appeared on the market as large and increasing purchasers, and for their thriving industry in finer counts could not dispense with the Egyptian product. North America imported in 1910 88 million pounds of Egyptian cotton to the value of 20 million dollars, and it will therefore be understood why the

United States use every endeavour to grow a cotton similar to the Egyptian variety in their own country.

Shipments of Egyptian cotton to the U.S.A. is not made direct, although this would be quite possible, but is transhipped at Liverpool owing to the powerful influence of the regular English lines of steamers at that port.

Of about 80,000 bales of Egyptian cotton imported yearly by Germany only about 20,000 bales go direct to Hamburg, concurrently with a small quantity to Bremen and Danzig, whilst the remainder for South Germany and Saxony goes via Trieste, for Alsace via Genoa, Venice, and Marseilles, for Rhineland via Antwerp, Rotterdam, and Hull; the Egyptian statistics state only the countries of the ports to which the steamers carry the cotton without consideration of the final country of destination. For this reason the total German turnover with Egypt is, as a matter of fact, considerably greater than given in these statistics. The cause for this is due to our more unfavourable geographical position, compared with that of our principal competitors, and to the circumstance that German steamship communication is not so short, frequent, quick, and cheap as that of our English, French, Italian, and Austrian competitors.

Direct freights between Alexandria and Germany are mostly entrusted to the Deutsche Levant Line in Hamburg, and to the Bremen Atlas Line, which are amalgamated; the North-German-Lloyd steamers carry some Egyptian cotton to France and Italy, also some for transhipment to Spain, and it also conveys, via Port Said, the supply of Egyptian cotton to the far East.

The export, in bales of 7·60 kantars, reached the figures given below. The countries of destination are arranged in the order of their importance imported :—

	1909/10	1910/11	1911/12
England .....	285,016	443,240	443,051
North America .....	66,542	125,575	124,013
France .....	69,815	85,524	83,153
Germany .....	64,937	85,249	76,958
Russia .....	48,769	70,133	72,309
Austria .....	43,161	49,365	50,656
Switzerland .....	26,274	33,522	36,881
Italy .....	27,437	35,600	28,210
Spain .....	13,375	21,126	19,006
India and Japan .....	14,411	19,392	19,320
Belgium and Holland .....	5,722	7,782	9,106
Turkey .....	3,954	3,048	2,397
Sweden and Portugal .....	361	535	219
	669,808	980,121	965,279

In conclusion, the quantities exported, together with the prices, are shown by the following figures, which refer to a few characteristic years :

Year	Quantity.	Average price per Kantar in Talleri* (Dollars),
1820.....	3 bales	—
1821.....	944 kantars	16
1822.....	35,000 "	15½
1823.....	159,000 "	15½
1824.....	228,000 "	17
1828.....	59,000 "	15
1830.....	213,000 "	12
1834.....	143,000 "	30¾
1835.....	213,000 "	25
1840.....	159,000 "	13
1845.....	345,000 "	6
1850.....	364,000 "	11¾
1852.....	670,000 "	10½
1855.....	520,000 "	7¾—10½
1860.....	501,000 "	11—13
1861.....	596,000 "	11¾—17½
1862.....	720,000 "	16—32
1863.....	1,181,000 "	30—46½
1864.....	1,710,000 "	37—52
1865.....	2,001,000 "	27—41
1866.....	1,288,000 "	27—42
1867.....	1,260,000 "	12½—24½
1869.....	1,289,000 "	22¼—34¼
1870.....	1,351,000 "	14¾—22½
1872.....	2,108,000 "	19—21¼
1874—75.....	2,206,000 "	19
1875—76.....	3,007,000 "	15½
1878—79.....	1,680,000 "	16½
1879—80.....	3,123,000 "	14½
1885—86.....	2,904,000 "	11¾
1890—91.....	4,263,000 "	11½
1895—96.....	5,225,000 "	10
1897—98.....	6,415,000 "	7½
1899—1900.....	6,496,000 "	10¾
1900—01.....	5,401,000 "	10¾
1901—02.....	6,526,000 "	9¾
1902—03.....	5,860,000 "	13¾
1903—04.....	6,144,000 "	14½
1904—05.....	6,376,000 "	12½
1905—06.....	6,041,000 "	15
1906—07.....	6,977,000 "	16¾
1907—08.....	6,912,000 "	13—20½
1908—09.....	6,814,000 "	14½—18½
1909—10.....	5,046,000 "	18¾—31¾
1910—11.....	7,477,000 "	18¾—24½
1911—12.....	7,364,000 "	17½—19¾

\*The price corresponds partly with the figures for export and partly with the official custom's declaration.

## THE FUTURE OF EGYPTIAN COTTON.

It is estimated that by making the fullest use of the area cultivated at present giving an average yield of  $4\frac{1}{2}$  kantars of cotton per feddan in Egypt, north of Assiut, 10,000,000 kantars of cotton per year could be grown, and a further 1,500,000 could be obtained by reclaiming and cultivating the large lakes near the coast and the neighbouring waste desert lands. As regards Lower Egypt, with the exception of the northern edge of the Delta, the maximum irrigable area of cultivation will very shortly be reached. On the other hand, there are still larger areas, apart from the Sudan, to be found in Upper Egypt, if the available water supply can be increased. Better crops than the present ones can be obtained from the poor land tracts if improved methods of cultivation, careful choice of seed, and the general application of artificial manure are introduced.

Still, the reclamation of new culturable land is only possible within very confined limits, as Egypt is simply a narrow oasis, drawing its sustenance from the Nile, and consequently the time will arrive when, even with the highest possible perfection of the irrigation system of the Nile, the limit of the supply will be reached. So Egypt will never, even under the most favourable circumstances, be a rival to the U.S.A. as regards the amount of cotton production.

More important for the Egyptian cotton industry than the extension of the cultivable area appears to be the problem of increasing the yield of the crops and maintaining the quality, which latter has placed the product of Egypt almost beyond any competition.

According to its quality, Egyptian cotton undoubtedly takes the first place in the markets of the world; with respect to length of staple, fineness, lustre, strength, and spinning qualities, it is second only to the best Sea Island qualities of North America and the West Indies; but as the total crop of Sea Island represents only from 5 to 7 per cent. of the Egyptian crops, one may be justified to say that as far as the manufacture of fine goods is concerned Egyptian cotton has no competition.

It is true, long-stapled cottons are also grown in North America, but the area sown with this type is rather on the decrease, which is one of the reasons of the increased importation of Egyptian cotton into that country. Up to a certain degree American long-staple cotton can compete well with Egyptian cotton, and when there are great differences of price between these and Egyptian types, the latter have already been frequently replaced by American kinds; the material falling-off in the quality of Egyptian cotton in the season of 1911, especially of Mit Afifi, made the substitution of American cotton for certain kinds comparatively an easy matter.

If it should become possible to successfully grow in another country a cotton of equal quality to the Egyptian type, under similar conditions of production, and this does not in any way appear impossible, a fall in the price of Egyptian cotton would occur, and a resulting economic loss would be sure to overtake Egypt; the risk of specialising on one crop and to neglect all others has already shown itself clearly during the bad cotton seasons of 1908 and 1909.

The first attempts to introduce Egyptian cottons into other countries have certainly, in the majority of instances, been unfruitful, even in the most suitable cotton states of North America, and in India and West Africa; but the attempts in the coast districts of Peru, in Hayti, Tunis, Syria, German East Africa, and the low-lying parts of Nyassaland, also, with the aid of artificial irrigation in the East Indian province of Sind, have undoubtedly been successful. Also the tracts of the dry, south-western part of the U.S.A., the States of Arizona and south-east California, appear suitable for the cultivation of Egyptian types of cotton, with the aid of artificial irrigation; in 1912 experiments extending to about 800 acres were there undertaken with Egyptian cotton. Afifi and Joanovitch, grown on the alluvial soil of Texas, aided by artificial irrigation, gave very satisfactory results. Whether the promising cultivation in these American districts will increase so quickly as to cover the home requirements of the United States, and possibly, at a later date, yield some cotton for export, cannot be foretold to-day. Even in such an event, Egypt would still have the advantage of greater proximity and cheaper freight rates as regards the European markets.

Egypt has been heavily burdened in its agricultural production through the extremely high prices of land, which have risen excessively during the last two decades; on the other hand it possesses, even to-day, the advantage of very low wages, and a unique position on account of its perfect system of irrigation, both of which, for the present, assure Egypt of its position in the supply of cotton.

In view of the strenuous endeavours of the Government, and of all engaged in this industry, it appears certainly possible to meet the wishes of the spinners respecting the growing of definite qualities.

## The Anglo-Egyptian Sudan.

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When England, after the re-conquest of the Sudan in 1898, took over the management of the country together with Egypt, without the system of capitulations, which was found to be so harassing in Egypt, nothing but chaos had to be faced in the Sudan. Enormous stretches of the country were entirely laid waste, production and consumption being reduced to a minimum, business of all description was undermined, and what was the worst of all, the population had decreased in an alarming manner during the ravages of the Dervish régime. Whereas about 8½ millions of natives were living in the Egyptian Sudan in 1882, in 16 years 3½ millions had lost their lives in wars, and about the same number had succumbed to illnesses and starvation. During many years neither life nor property had been secure, and the population had declined to about 1½ millions, and this in a country which, with the addition of Lado Enclave, covered an area of 2,505,900 square kilometres, and is consequently five times the size of Germany.

How does this country look?

### THE LAND.

Contrary to the hilly Western Sudan, lying within the sphere of French influence, the flat Egyptian part of the Sudan, extending between the 5° and 22° northern latitude, in which the Nile waters a narrow strip of fertile land, is mostly a steppe. The North shows first a continuation of the Egyptian desert, then follows from near the Atbara savanna land, covered with scrub and brush, mostly acacias, and only in the most southern portion does the vegetation become tropical. The chief products of the Sudan for the export trade were always gum arabic, ivory, ostrich feathers, and some rubber, but also the whole of the plants cultivated in Egypt grow well in the Sudan. It is estimated that only 8,000 square kilometres, *i.e.*, 3 per 1,000 of this immense district, were under cultivation in 1909, the rest was desert, steppe, swamp, and virgin forest. A rather important factor as to the fertility of the soil are the "Wadis," *i.e.*, more or less perceptible hollows which have been washed out on the surface by rain, dried-up watercourses, in which more moisture has remained than in the surrounding parts of the land. They are not only the cultivable spots in all the regions that do not lie close to a river and have no satisfactory rainfall, but also the best natural meadows.

The population of the Sudan has, meanwhile, risen again to almost three millions, of which in the year 1907, in round figures, 3,100 were Europeans, and 17,000 Egyptians, Abyssinians, and Indians. The capital, Khartoum, with Khartoum North and Omdurman, had at that time a resident population of 127,000, of whom 2,400 were Europeans. Fifty per cent. of the total population are found in the two provinces of Kordofan and Bahr-el-Ghasal.

## CLIMATE.

The climate of the Sudan is generally a dry desert climate, considerably hotter than that of Upper Egypt, and in the south it is tropical. The mean annual temperature in Khartoum reaches  $28.6^{\circ}$  C., in January  $22.7^{\circ}$  C., in June  $34.5^{\circ}$ , and it frequently rises above  $45^{\circ}$  during the afternoon. For the year 1904 the following temperatures were given for :—

	Suakin.	Khartoum.	Kassala.	El Obeid.
Average temperature ..	27	28	27	25
Average humidity ....	62	30	40	—%

Cool north winds blow from October to March. North of the line of latitude of Shendi ( $17^{\circ}$ ) the climate is always dry, whilst to the south of this zone one enters the district of tropical rainy seasons, which fall from July to October, reaching their maximum in August; they increase the further we go in a southern direction, especially towards Abyssinia, causing the climate to be moist for about three months, whilst during the remainder of the year it remains dry. Between Shendi and Khartoum the rainfall is local and irregular, which consequently renders only the cultivation of quickly-maturing grain crops, such as Durra (Sorghum) and Duchi (Pennisetum) possible; south of Khartoum, however, the rainfall increases pretty uniformly, and to south of Wad Medani, the capital of the Blue Nile province, the rainfall becomes so abundant and regular that the natives grow, between here and up to about latitude  $13^{\circ}$  north, rich crops of the varieties of millet, and also of Indian corn, sesame, ground nuts, and cotton, all as rain cultivation. During the rainfalls, which occur mostly in the form of thunder showers, the thermometer falls in some places to zero, and the low-lying river beds become changed into malarial swamps. The annual rainfall amounts to 150 cm. in the neighbourhood of the Victoria and Albert Lakes and in the Abyssinian Highlands, 100 cm. in the eastern portion of the Bahr-el-Ghasal district and in the middle course of the Sobat and Atbara, 50 cm. in the western portion of the Bahr-el-Ghasal, but does not exceed 25 cm. in the lower reaches of the White and Blue Nile, as well as of the Atbara, and the entire tract north of Shendi receives such a scanty supply of rain that it may be regarded as almost rainless.

The following rain measurements are given for the years 1906/11 in the cotton districts, the quantity varying very considerably for individual years, viz.: Khartoum, 87 to 232; Kassala, 290 to 388; Wad Medani, 307 to 508; Senaar, 324 to 619; Singa, 480 to 677 mm. To-day there are meteorological stations erected in 13 principal places of the Sudan.

## WATER SUPPLY.

In the Sudan also the possibility of culture depends in the first place upon the question of water supply. But in the Sudan, the very life does not depend only on the Nile the same as in Egypt, for, leaving the other watercourses and springs out of account, the annual rainfall and the duration of the rainy season

of the Sudan increase towards the sea coast and towards the south, and many districts have a heavy rainfall. The climate does not, everywhere and always, afford enough nourishment, but in many places agriculture is possible without artificial irrigation. All the more profitable plants, such as cotton, certainly require a period of watering, which should extend over the flood time and rainy season; without artificial irrigation, with rainfall alone, hardly anything else but Durra can be produced, and even this crop can only be grown on an extensive scale in years of ample rainfall.

Along the Nile, irrigation through the flood or water lifts is feasible on a narrow strip along the banks, except where the hills approach the stream so closely, as is the case in the unfruitful and sparsely-populated province of Wadi-Halfa, that cultivation of any crops is practically impossible. In the provinces of Dongola and Berber the valley is mostly broader, the land rises very gradually from the river banks, whilst in some specially favourable places the hinterland of the dams is below the level of the river banks, so that cultivation can be carried on there with the aid of irrigation as far inland as 5 km. to 7 km. from the river. It is precisely in these places where concessions for agricultural purposes have been granted by the Government, and where the first trials have been made to introduce systematic methods of irrigation and cultivation, including cotton. Besides, transport is facilitated here by the proximity of the railways, especially in the province of Berber. Cultivation by natives is here also more developed than in the southern provinces. Nevertheless, to the north of Khartoum agriculture will always be limited to a narrow strip of land on the river bank.

Regarding the possibilities of irrigation in the Sudan, four principal kinds of land enter into the question:—

(1) The small tracts of land lying in and around the Nile valley, which during high water become flooded naturally without artificial assistance, and which are clear of water and cultivable at low water, viz.: Islands (Gesireh) or the slopes of river banks (Garf). The ownership of cultivated land, which is covered at flood time and clear at low-water of the Nile, called "Seluka" lands, seems very difficult to ascertain.

(2) "Sakieh" land, which is watered direct from the river by means of water-wheels, draw-wells, or ordinary wells. As this manner of watering is unprofitable on account of the difficulty of procuring labour and fodder for the oxen that work the wheels, one endeavours, where possible, to provide a substitute; in the districts of Dongola and Kassala this is being done by the introduction of basin irrigation, and in the provinces of Berber and Khartoum by pumping plants.

(3) Hinterland of the rivers, situated somewhat lower than the dams, and which is only now and then, about, say, once in every 3 to 20 years, watered through the occurrence of a specially high Nile flood, which then makes the cultivation of "duchn" possible. Otherwise these tracts of land, called "Karu," which are chiefly to be met with in the provinces of Berber and Khartoum, are used as pasture for cattle, and, when they are timbered, for the supply of wood for building purposes and fuel.

In the above-mentioned three kinds of land, it is necessary for

the cultivators to live near to the river, and the villages of the provinces of Dongola, Berber, and Khartoum are situated, therefore, no more than  $1\frac{1}{2}$  km. from the Nile.

Independent from its distance from the river is the 4th class of cultivable land areas, viz., those with rain crops, which, as the provinces of Wadi-Halfa and Dongola are as good as rainless, commence on a small scale only in the province of Berber, become more numerous, however, about 50 km. south of Khartoum, but even there it happens pretty frequently that through the local nature of the rainfall a village can grow for two or three years in succession hardly any other crop than "duchn."

The small land tracts watered by the Nile flood represent about 10 per cent. of the total land of the Sudan which is under cultivation, about a further 10 per cent. is represented by artificially irrigated land, about 80 per cent., by far the largest proportion, is land watered through rainfall.

Expressed in thousands of acres the following areas were under tillage in the Sudan :—

	1904	1905	1906	1907	1908	1909	1910	1911
With Flood ..	43	61	95	117	82	148	112	118
With Artificial Irrigation ..	100	107	117	121	116	102	107	117
With Rain Crops ..	386	536	796	1,186	908	1,221	1,569	1,192
Total ..	529	704	1,008	1,424	1,106	1,538	1,788	4,127

The further economic development of the Sudan depends, for the most part, upon the possibility of finding a similarly happy solution of the question of watering as in Egypt, and, indeed, the question of the extension of cotton cultivation depends primarily on this solution. Basin irrigation of 150,000 feddans in the province of Dongola and 200,000 feddans in the province of Kassala has been completely planned, and even partially executed, at a cost of about £2 per feddan; well-considered irrigation schemes, by means of a dam and canals, for 3,000,000 feddans in the Gesireh have been elaborated, and also the distant small tracts of land to the east of the Blue Nile, through which the Atbara flows, can be artificially irrigated, so that in the Egyptian Central and East Sudan probably as many as 12 million feddans of land can be brought into cotton cultivation, because the Blue Nile and the Atbara could, without injury to the requirements of Egypt, supply the necessary water.

The difficulties in the way of a further extension of the irrigation works in the Sudan are up to now to be found in the fact that, with the exception of the natural overflow, only a *very* restricted quantity of water for artificial irrigation in summer may be taken from the Nile in the Sudan, according to an agreement with jealous Egypt, so long as the extensive regulation of the distant swamp regions of the Bahr-el-Gebel is not carried out, which would double the quantity of Nile water available for the use of Egypt, and which, according to Sir William Garstin's project, is said to necessitate an outlay of £20,000,000, in round figures. This scheme would

ensure Egypt's water supply from the 15th March to 15th October, and the Sudan's supply from 15th May to 15th March. For the time being, however, the Sudan must bow to the claims of Egypt.

With the exception of the stretches of land near to and north of Khartoum, the Sudan crops can be grown during the flood and winter months, *i.e.*, from 15th July to 1st February, between which dates no restrictions as to the use of water are imposed by the Egyptian Government; only pumping for the purpose of watering is permitted in the Sudan during this period. In almost all the southern parts of the Sudan, on the contrary, the pumping of water from the Nile between the 1st February and the 15th July is prohibited by the authorities, in order not to take away from Egypt too much of the priceless fluid, and it is precisely during the months of May, June, and July that systematic waterings are essential to the life of the cotton plant; at the present time only the very trifling area of 10,000 feddans are allowed to be brought under artificial summer irrigation, which area, it is said, will be doubled after the completion of the raising of the Assuan dam.

The problem of the irrigation of the Sudan is complicated by the fact that the Sudan is to receive water without causing any detriment to Egypt. It would be an object worthy of all efforts to arrive at an agreement between the administrations of the two countries, by which a certain minimum quantity of water during every season of the year, based upon the requirements and upon the natural low-water depth of the river, could be secured for Egypt, and that the remainder of the water be allowed to run free for the requirements of the Sudan. As the first great work, the building of a weir-dam on the White Nile, not very far from Khartoum, will evidently be commenced soon.

#### LABOUR QUESTION.

A further important preliminary condition for the agricultural development of the Sudan, next to the construction of modern means of communication, which are always readily put down by the practical English nation, is the training of a sufficient supply of labourers. We have to deal with the three native groups, Nubians in the north, the Negroes in the south, and the Bedouins in the desert; the latter are partly genuine Arabs, partly Hamitic aborigines, the successors of the old Ethiopians.

The Nubians are industrial agriculturalists, but they are not as efficient as the Egyptian fellahs, and are not very numerous. The Arabs are partly nomadic tribes owning herds of cattle, they are cattle breeders and huntsmen; in some places they are excellent agricultural labourers. The Negroes living in the southern districts are partly engaged in primitive agriculture, attended to mostly by the women, and in those parts which are favoured with sufficient rainfall they rear cattle. The total native population, although it may have increased relatively quicker under the "Pax britanica," especially amongst the negroes, and is estimated to-day as being three millions again, must still be considered as sparse, and the Sudanese negro, however many advantages he may have, is, as regards the male population, not much good for agriculture, and, moreover, he is an unwilling worker, although the wages may be

excessively high. In consequence of his few requirements, he does not need much work. He spends about 10 P.T. to 15 P.T. per month, and as he can earn these in two to five days he prefers to be lazy during the remainder of the month and to live on his earnings of the few days' work, consequently the negro is of very little value at present for the economic development of the Sudan. Contrary to the negro, the Egyptian fellahs are extremely industrious, but on account of the former bad reputation of the Sudan they have so far a strong disinclination against emigration to the Sudan, although the favourable economic development of the Sudan will no doubt cause an increasing number of neighbouring fellahs to settle there. Lord Kitchener hopes, but I think he is somewhat optimistic, that in further five years the population will be six millions; in fact, in view of the increased prosperity during the last 14 years of peace, there are no poor to be found in the country. The Sudanese is not, as is mostly the case with the Egyptian fellahs, in the hands of the usurers, but he is generally free from debt.

A Central Labour Bureau, instituted in 1908 by request of *Slatin Pasha*, was to be an intermediary between the labour supply and demand, and it was intended that this Bureau should aim at the regulation of wages. Originally this bureau was to comprise all kinds of labourers, but gradually it has been used solely for the requirements of the Government, which fixed, in 1911, the daily wage of unskilled labourers in all Government departments at 3 P.T.

This fixed wage, however, did not answer, and even Government will pay 4 P.T. to 5 P.T. in order to get labourers at all. There is not a sufficient supply at the price of 3 P.T. Generally speaking, private individuals can obtain workmen cheaper than the Government. The daily wage labourers in the country, the Arabs and Sudanese, receive generally 3 P.T. to 4 P.T., the women get 2 P.T. to  $2\frac{1}{2}$  P.T., and children  $1\frac{1}{2}$  P.T. The picking of cotton is mostly undertaken by women and children.

#### AGRICULTURE.

At the time when England intended to get a firm footing in the Sudan, probably political reasons were the leading factors, more so than economic ones, and it is only due to the introduction of general civilisation that the economic possibilities could gradually be discovered and developed organically. At the present everything in the Sudan points to the raising of agriculture, this is naturally the central attraction of the whole colonial activity, and science, legislation, and administration tend in this direction. The conditions for agriculture are in the northern and southern parts entirely different. In the districts north of Khartoum, with their dry climate, we have the problem of artificial irrigation, its expenditure, and the question of finding sufficient labour supply; in the southern part of the Sudan, on the other hand, where the zone of tropical rain begins, we have, besides the question of labour, the difficulties of transportation. Enormous stretches of desert land in the north will hardly ever be brought into cultivation, on the other hand, towards the Equator the soil becomes improved and in parts is quite exceptionally good.

The natives plant in the main "Durra," then also "Duchn," wheat, maize, leguminous crops, sesame, castor, ground nuts, lupins,

dates, and cotton, a little rice and sugar cane. These products are principally for their own requirements, but the surplus goes to Egypt. The Sudanese have a very large stock of cattle, sheep, and goats, but the breeding and sale of these are made difficult in consequence of frequent epidemics.

For the purpose of improving agriculture, the administration has selected primarily the tracts between Wadi Halfa and Sennar, viz., the provinces of Dongola, Berber, Khartoum, and Gezira, of which the district south of Khartoum is by far the most promising. The regions north and south of Khartoum have even to-day the densest population of the Sudan. The average humidity of the air is higher towards the south, but does not seem to cause an unfavourable influence on the quality of the cotton; it is, however, to be feared that the tropical rains which take place regularly south of Khartoum during the months of July to October will at times injure the cotton plantations when they happen to come during the flowering or ripening periods of the bolls. The province of Kassala and the neighbourhood of Tokar promise also good results, and the whole of the south seems suitable for rain cultivation.

Experimental farms have been established for some time by the Government for cotton and other crops at various places, but some of them, as has been the case at Shendi and Kamlin, have again been abandoned. To-day the Government has six experimental farms besides a few small areas which we leave out of account. There is first the central experimental farm at *Shambat* near Khartoum, which has been transferred in 1912 to the Gordon College, and here it is intended to establish later an agricultural college; this experimental and demonstration farm, which is devoting its attention principally to the cultivation of cotton, promises to bring a favourable solution to the many disputable points regarding agriculture. The farm is under very able management. The large trial station at *Tayiba* in the Gezira, which has artificial irrigation, is specially destined to promote cotton cultivation. Of this farm I will speak in detail later on. In the south, at *Singa*, there is an experimental farm specially for the improvement of the rain crops of that district. Finally, the Government possesses three model farms for cotton in the Tokar district. Attention is also paid to the American system of dry farming.

Insect and plant pests are, generally speaking, of rare occurrence in the Sudan, and precautions have been taken against their introduction. A boll-worm confined to the Sudan is "*Diparopsis castanea*."

The scientific mainstay and assistance of the Sudan Government is the Gordon Memorial College in Khartoum and the Wellcome Tropical Research Laboratories, which were established in connection with it in 1902. The magnificent buildings of the Gordon College contain a school for natives, a museum for local geography, and laboratories for chemistry, botany, entomology, bacteriology, and medicine.

In 1905 the Sudan Government founded a special Department of Agriculture and Forests, and in 1906 the Central Economic Board, consisting of the higher officials of the different Government Departments, was created. Contrary to Egypt, the English language is in the Anglo-Egyptian Sudan the only recognised European language.

## SURVEY, SALE OF LAND, AND LAND TAX.

Land in the Sudan is owned as "Kharadshi" land, *i.e.*, after it came under Mohammedan reign, it has remained against payment of a tribute in the peaceful possession of the former owners, but the Government has certain rights of supervision which enable it to protect the natives, if need be, against European and other speculators of land. The Land Ordinance of 1899 and that of 1905 gave the basis for the gradual survey of the cultivated land and the establishment of claims on land ownership, which had become very uncertain during the unrest caused by the Dervishes. The beginning was made with this survey in the provinces of Wadi Halfa, Dongola, Berber, Khartoum, and the Blue Nile provinces. All wooded and uninhabited land, for which no private ownership could be ascertained, was taken to be the property of the Government. As regards the ownership of land of the natives, it was decided that they can be expropriated by the State, in case of necessary construction of public works for irrigation, against a corresponding payment or transfer of land in another district. Further, the decision was arrived at, that the purchase of land belonging to the natives by native or European speculators must be avoided, and it is now only possible to sell land with the sanction of the Governor of the province. Expropriation by private individuals is not admissible, as the Government of the Sudan, just as in Egypt, intends to protect, before everything, the number of small holdings. Even as regards the sale of public land, the Government takes up a very reserved attitude and never grants concessions of land where there is the slightest possibility that the purchase is purely of a speculative character. The Government insists that first of all the survey should be completed, and that an official land register should be instituted, which will facilitate in future the transfer of land.

On the basis of the survey the Ushur taxes (the Mohammedan law of one-tenth) are being replaced by a tax which extends to all the cultivated land. This latter is divided into six classes, ranging from 10 P.T. to 60 P.T. per acre. So far, only the land which has benefited through the Nile flood or through artificial irrigation has paid a land-tax. Land where rain cultivation is carried on is to be taxed in this way only after the completion of the present survey; until now Ushur tax, representing a one-tenth part of the crop, is levied there.

The conditions of the purchase of Government land vary in the different parts of the vast territory very considerably, and every case is treated by itself, according to the special nature, by the Department of Agriculture. When concessions are asked for land belonging to the Government, the applicant, after depositing security, receives permission to begin his preliminary investigations. After the lapse of the period stipulated he must submit to the Government the full programme of his scheme of land development and irrigation, on the basis of which the concession may be granted and the final contract be signed. So far Government has given land on lease at 10 P.T. per feddan for a period of 75 to 90 years, under the condition that the property will be converted into freehold, if certain prescriptions of cultivation are fulfilled. In this way applicants for land, who wanted the same only for speculation with a view to re-selling it, have been excluded. Of course, such procedure will not easily induce

foreign capital to come into the country, and it seems to me that some facilities will have to be granted. It is also a principle of the Government that not more than four to five thousand feddans should be given to one concern, and less, if the means of the applicant do not correspond with the requirements of the land.

Land situated on the Nile near Khartoum may be bought from private owners outright at 40 P.T. to 50 P.T per feddan.

#### AGRICULTURAL CREDIT.

As long as there was no bank in existence in the Sudan the Government granted to the peasants small advances mostly for a period of three years against payments of  $7\frac{1}{2}$  per cent. interest per annum, under the supervision of the local authorities, provided the money was required for the purchase of cattle and agricultural implements, and for the construction of water lifts.

In 1906, the National Bank of Egypt, which has agencies in Khartoum, Suakin, and Port Sudan, introduced the system of granting peasants advances against mortgage of their crops, and of protecting them against usurious rates of interest and artificially kept down prices. Generally speaking, however, agricultural credit in the Sudan is very difficult to obtain for the small farmer, except at an excessive rate of interest.

#### COTTON CULTIVATION.

Quite an intense interest is being bestowed lately in the Sudan to the introduction of a rational system of cultivation of cotton. Cotton grows wild almost everywhere in the Nile Valley of the Sudan, and is cultivated by the natives for their own use. The staple of the cotton grown by them is mostly short, nevertheless, quite useful qualities are produced with primitive irrigation, or, as is the case in Sennar, as a rain crop. The Sudan cotton, which has a small boll, is mostly cultivated as a mixed crop with Durra, and is sold by the Sudanese for the damoors, a cloth which is very much appreciated and is used for the ordinary clothing of the natives, but is also worn by Europeans. Although the fibre of this cotton may only be 23 mm. to 26 mm., therefore considerably shorter than the Egyptian cotton, still it has a distinct relationship with the latter. Evidently the Sudan cotton is an offspring from crossings of the indigenous kind with the old Jumel cotton, cultivated in the Sudan several decades ago, at the time of the Egyptian occupation, the traces of which are met with everywhere.

The following indigenous kinds are known: The annual "Belledi" shrub, as for instance in Sennar, is quite a different kind from the Egyptian cotton, and resembles more the Uplands or Hindi cotton, it has a white flower and a white inferior fibre; but the wild-growing Nyam-Nyam kidney cotton, grown in Bahr-el-Ghazal, whose dark yellow flower has a red centre, seems to have some relationship with the Egyptian or Peruvian kind. Besides these, there are two tree cottons of Asiatic character, viz., one with yellow flowers but larger red spots than the Egyptian cotton, it has a white, short and coarse fibre and a small seed, and, finally, there is a red-flowering tree cotton.

The cottons grown recently from Egyptian seed, such as Ashmouni, Afifi, Abbassi, Nubari, Joanovitch, and Sakellaridis are considerably better than the indigenous kinds of the Sudan. The staple is longer and finer in every case than "fully good fair Egyptian," and the results obtained with Egyptian seed justify the expectation that the Sudan will, at some later period, be able to produce large quantities of cotton of a quality approaching the Egyptian kinds. It is quite possible that in the course of years a special local variety may develop itself in the Sudan. Afifi and Nubari seem to have given the best results. Unfortunately, Hindi cotton has been introduced with the Egyptian seed, and in some districts this Hindi is becoming very prevalent.

The natives so far have not taken generally to the Egyptian kinds because the low indigenous varieties, which suffice quite well to their requirements, necessitates less care in the cultivation. But the women who do the spinning have already found the great advantage which the long-stapled Egyptian cotton has, and this fact should lead to the general introduction of Egyptian kinds. In most cases, cotton cultivation is not carried on as a pure cultivation, but as a mixed cultivation. Due to laziness and conservative principles, and in order not to suffer too much from a failure of one crop, the natives sow, according to ancient methods, together with cotton, other field crops, as Durra, lentils, &c. The provinces of Wadi Halfa, Dongola, Berber, and Sennar report that the natives find the cultivation of wheat, barley, and vegetables frequently more remunerative than that of cotton.

Experiments have also been made with American Upland varieties, and as regards quantity and quality of the yield they have shown very satisfactory results. These might be considered in some districts where the cultivation of Egyptian cotton is excluded.

As far back as 1899 Lord Kitchener distributed cotton seed in Berber and Khartoum. The Sudan Government established a cotton trial farm at Shendi, and took various steps in order to promote the cultivation of cotton; for instance, it distributed free seed, published in English and Arabic circulars which explained the best methods of cultivation of cotton, and granted certain advantages to Egyptian settlers in order to indemnify them in this way for the lack of experienced agricultural labour, by placing at their disposal land, water-wheels, agricultural implements, and cattle at very favourable conditions.

The experiments on the Government farm at Shendi in the province of Berber showed that cotton does as well, whether sown in September/October, after the floods of the Nile, or in March/April, as in Egypt, or in June/July, before the high flood. Every one of these three planting periods offers certain advantages. Generally speaking, the period of growth of cotton in the Sudan, corresponding with the higher temperature, is slightly shorter than in Egypt. The proper time for sowing is governed in the first place by the possibilities of irrigation, and it is therefore different in some parts of the country. In fact, experiments in this respect have not yet been completed in all parts of the country.

On the banks of the Nile, north of Khartoum, in the province of Berber, the sowing is generally undertaken in May and June, and the

picking from November to February. It is necessary to be governed in this direction according to the time during which the Sudan is allowed to take water, *i.e.*, from the 15th July to the end of February, although one runs the risk that the minimum temperatures, which are at times very low, in December and January, may influence very unfavourably the growing and ripening of the plant. Cotton cultivation is in these districts, therefore, a lottery. One year it may turn out very well, and the next be a complete failure.

On the White Nile, near Khartoum, sowing is generally done in July, when the Nile has already risen; three pickings are made before it reaches its low level in February.

On the Blue Nile we met, up to the town of Sennar, frequent cultivations along the banks, the fields being irrigated by means of "Saquias." From there the villages and settlements extend right up to the White Nile, and the fields of Durra follow in an uninterrupted line for miles along the banks of the river. In going towards the south, the cultivation becomes gradually less, and the population sparse, in spite of the rich soil. Even along the banks the population is not very numerous. In the south of the Sennar province, where cotton is grown with the help of the rainfall, the sowing is done in October after the rains, and the crop is being picked in February and March.

On the Dinder river cotton is sown in July when the first rains are falling, in the flood-beds of the river, and four months later the first picking is made. In good years 400lbs. to 1,000lbs. of seed cotton are taken from one feddan.

In Tokar sowing is carried out according to the arrival of the flood, which varies from August to October, and the crop is accordingly from January to May.

The British Cotton Growing Association has also assisted the cotton growing experiments of the Sudan, although, owing to lack of funds, was not able to take, until recently, an active part in the development. By their request, Carver Bros. & Co., a large cotton firm in Alexandria, sent, in 1904, buyers to the Sudan for the direct purchase of cotton from the planters against cash payment at 40 P.T. per kantar indigenous, and 60 P.T. for Egyptian cotton, dry and clean picked, and free railway station. In later years it was arranged that no indigenous kinds of cotton should be bought by them, and this should be left for the consumption in the Sudan. The purchases were to be only for the Egyptian kinds grown in the Sudan, at a promised average price of 66 P.T. per kantar for unginned cotton, and 200 P.T. per kantar for ginned cotton, which was to be ginned in the new ginning station adjoining the workshops of the Gordon College in Khartoum and Kassala. These prices were not very high, but they showed to the different planters, nevertheless, the possibility of a ready sale of the cotton, and in order to further encourage cultivation Messrs. Carver & Co. promised to the native chiefs a cash premium of 1½ P.T. for every kantar of cotton grown from Egyptian seed which was brought to the market in the district of the chief.

The Sudanese kantar of seed cotton is not calculated on the same basis as in Egypt, at 315lbs., but only at 100 Rottls of 449 grammes.

Later on, Messrs. Carver & Co. limited their direct purchases to Tokar, because the quantity grown in the interior of the Sudan was not important enough.

For cultivation on a large scale the provinces of Berber, Khartoum, and the Gezira enter into consideration. Small experiments have also been made on the tributaries of the Blue Nile, and of the Atbara, also at Kassala on the Ghash, near the Abyssinian frontier, and in the valley of the Baraka, in the district of Tokar, near the Red Sea. The Red Sea province, up to now, is the largest producer of cotton in the Sudan.

In 1910, 40 per cent. of the cotton crops of the Sudan were raised under rain cultivation, 51 per cent. by flood cultivation, therefore 91 per cent. on small holdings of the natives without any European assistance whatever, and only 9 per cent. were grown by artificial irrigation.

Cotton cultivation on a large scale in the Sudan is only possible on the enticing example of Egypt, with artificial irrigation; the difficulties existing in this respect have already been indicated. Government does not give concessions for land at the expense of the reduction of native small holdings, and if there is the slightest taint of speculation in a proposed undertaking the concession is withheld.

The largest modern cotton plantation of the Sudan is to be found in Zeidab, on the western bank of the Nile, in close proximity to the confluence of the Atbara in the province of Berber.

This concession, which originally is for 10,000 feddans, giving also the right of purchase of a further 30,000 feddans, was granted by the Governor-General, Sir Reginald Wingate, to an enterprising American, called Leigh Hunt, who came in the autumn of 1903 to the Sudan, and, assisted with British capital, floated, in 1904, with a capital of £80,000, the Sudan Experimental Plantation Syndicate, at El Damer. Mr. Leigh Hunt secured the services of a young Englishman, a former Government Inspector of Agriculture, Mr. J. Neville, and a few negroes from Carolina and Louisiana, who proved a great success, but could not stand the climate. The Company commenced at once the economic development of the district, and after severe struggles, without taking notice of unfavourable criticism, they proved the rentability of cotton growing in Zeidab. In 1907, Hunt and Neville retired from the Syndicate, and with the help of strong capitalists from London, especially assisted by the firm of Werner, Beit, & Co., a new Company, called "The Sudan Plantation Syndicate, Ltd.," was organised, with a capital of £250,000. The manager of this company is Mr. D. P. Macgillivray.

In 1910, the Zeidab area was divided up into lots of different sizes amongst the 234 tenants, of whom 109 were Berberines, 60 came from Upper Egypt, 18 from Dongola, 24 were Greeks, 2 Assyrians, and 1 Englishman. They undertook to grow only one-third of the leased land with cotton, one-third with wheat, and one-third with leguminous crops, the latter to be ploughed in or to lie fallow.

The most practicable size of the small holdings on the farm has been proved to be 30 feddans, which can be farmed by one family.

The tenant who takes up new land has to clear it first from bushes and roots, for which he gets a fixed price. He then receives

oxen and implements in order to level the country, or if the soil is heavy it is worked first by the steam ploughs belonging to the Company. The cultivation may then begin and the tenants receive advances every fortnight in proportion to the quantity and quality of their work. These advances are made on account of the crop that is to be gathered. No interest is charged on these crop advances, as it is intended to encourage the tenant in every way possible and in order to make him prosperous. That tenant who can show the largest yield per feddan in any year receives a premium of £5. The first large shipment of cotton from the Zeidab plantation in 1909 proved conclusively that Egyptian cotton of excellent quality can be grown in the Sudan. For this cotton \$1 above the usual Egyptian contract grade was paid.

The land of the Company is not situated directly on the rich silt soil near the banks of the Nile. That has been taken up in most places by the natives, and is cultivated by them either with the help of the Nile flood or by means of primitive water-lifts. The land of the Company is behind these native farms, further up in the interior; it is owned as "Karoo" by the Government, and the Nile water must be pumped on to it. For the irrigation purposes there are four 30in. pumps, one main canal of 6 k.m. in length and 10 m. in width, and about 400 km. of contributory canals. The high price of coal in the Sudan causes the expenses for the pumping station to be very high.

For the ginning of the crop, the British Cotton Growing Association sold to the Company 10 gins and a hydraulic bale press of 250 tons.

In the planting season of 1909, 720 feddans were planted with cotton in Zeidab. These gave on an average 1,300lbs. of seed cotton = 400lbs. of lint—which were sold in Alexandria at 30 P.T. to 40 P.T. higher than "Egyptian fully good fair," whilst the seed realised £1 per ardeb. The yield per feddan was therefore :—

$$\begin{aligned} 400\text{lbs. lint at } \text{£E}6 \text{ per } 100\text{lbs.} &= \text{£E}24 \\ 920\text{lbs. seed at } \text{£1 per ardeb} &= \text{£E}3\frac{1}{2} \end{aligned} \quad \left. \begin{array}{l} \text{= £E}27\frac{1}{2}. \\ \text{=} \end{array} \right.$$

In 1909, the Zeidab Syndicate obtained the option to buy a far larger estate adjoining the present concession, and also to supply the water from the pumping station for 1,400 feddans of neighbouring land belonging to the natives, in the hope that this trial on a co-operative basis would be welcomed by the natives, and to further stimulate private initiative in this direction, and finally to cause an entire disappearance of the ineffective lift-wheels.

In 1910, the Syndicate took over further 5,000 feddans of land, and of the 12,000 feddans which are now owned by them 3,270 are under cotton, about 3,000 under wheat, and about 2,500 under leguminous crops.

The budget for the average tenant with 10 feddans of cotton land works out as follows :—

Receipts :—	£	£
4,500lbs. lint at 1s. ....	225	
9,000lbs. seed .....	30	255
Payments :—		
Rent, £4 per feddan .....	40	
Growing and picking .....	30	
Seed, ginning, pressing .....	7	
Freight to Alexandria .....	17	94
Profit of the tenant ...	£	161

In this calculation it must be considered that, in consequence of the failure of the Egyptian crop in 1909, exceptionally high prices were paid.

The satisfactory results achieved in Zeidab seemed to encourage the extension of this system along the whole length of the river between Zeidab and Khartoum. The banks are almost everywhere occupied by the cultivation of the natives, and the hinterland being at a lower level than the Nile bank could easily have been changed through a chain of pumping stations into flourishing cotton plantations. It is just these lower-lying "Karoo" lands which are the most suitable for the establishment of larger undertakings, and they are most in request for land concessions.

The season of 1911 was, however, very unfavourable for Zeidab. The cotton crop had to suffer much from cool weather, and from the attacks of boll-worm, so that the Company, besides having suffered direct losses, was also suffering from the fact that the natives were not in a position to pay for the water rent. Therefore, the water supply was refused to them temporarily.

The season of 1912 was again more satisfactory, and The Sudan Plantation Syndicate has paid its first dividend of 12½ per cent.

Nevertheless, the great fluctuations in the yield of the crop seem to be a question of importance.

Besides the modern plantation at Zeidab there are in the north of Khartoum cotton plantations at Sagai, Kaderu, Kelli, Fadlab, and Darmeli on the Nile, and at Minawi on the Atbara, all on land for which the Government has given concessions, but these plantations had, in 1910, only about 1,000 feddans planted with cotton, and have not extended the area since then. All these plantations have not achieved satisfactory results, and there does not seem to be any prospects that the future will show an improvement. A concession given for Soba near Khartoum was not followed up at all. It must also be considered that, even if cotton cultivation north of Khartoum pays, the field crops that must be grown in rotation with cotton, on account of the cost of artificial irrigation, can only be sold in the immediate neighbourhood with a small profit.

Inclusive of the cultivation by natives, 36,000 feddans were grown with cotton in 1908 in the provinces of Dongola and Berber. In the province of Dongola the rapid rise and fall of the flood in 1911 caused difficulties in the way of irrigation, and on account of cold weather in November, and of the presence of the cotton worm, the cotton crop remained behind the average. In fact, the cotton produc-

tion in the districts north of Khartoum has been through the various years subject to severe fluctuations. There were :—

In the year 1905, 226 tons unginned.

”	1906,	124	”
”	1907,	361	”
”	1908,	219	” and 161 tons ginned.
”	1909,	389	229 ”
”	1910,	798	” cotton, and cotton seed. ”
”	1911,	747	” ” ” ” ”

In the province of Berber, cotton is sown either in March and picked in August and September, or in June and picked in November to February. The quality of the first crop is excellent, but the latter period is more to be recommended owing to the easier means of obtaining the water at the time of the Nile flood.

Particularly favourable prospects exist for cotton growing in the most fertile alluvial land of the *Gezira* plain, a kind of peninsula between the confluence of the White and Blue Niles. This table-land, tapering gently from east to west, forms, so to say, an ideal country for irrigation, which receives water from the Blue Nile that is rich in manuring substances, and takes it to the White Nile. The area, which is equal to one-third of the whole of the cultivated area of Egypt, could grow, with the necessary irrigation, three to five million feddans with wheat and cotton alternately. Sir William Garstin, and the well-known Manchester gentleman, The Right Hon. Sir William Mather, have suggested the following irrigation system : A weir at Sennar on the Blue Nile, and a number of pumping stations and canals are already decided upon for the northern part of that area which is to be taken in hand first. This measures 500,000 feddans, and the necessary capital outlay would be £3,000,000 sterling. The work would require 10 to 15 years to complete. As cotton and wheat could be planted here with success, if the necessary water supply is provided up to the end of March, whilst Egypt requires the water mostly from April to the end of July, it is evident that the water requirements of the two countries would not enter into competition. If necessary the Tsana Lake in Abyssinia might be constructed into a reservoir, or the water from the White Nile might be utilised too.

After Sir William Mather had, on the 13th October, 1910, explained, in an address delivered in the Town Hall of Manchester, the great importance of the Anglo-Egyptian Sudan, and especially of the *Gezira* plain, as regards cotton growing, thus stirring up the interest of the cotton industrials of Lancashire to the proposition, The Sudan Plantation Syndicate, Ltd., offered to undertake, on behalf of the Sudan Government, trial experiments with cotton and other products at Tayiba in Wad Medani, on the Blue Nile, during three to four years, with the financial assistance of the Government. It was decided to await these results before embarking on the execution of the larger scheme, for which the necessary funds had still to be found. These may be either advanced directly by the Government, or from a specially authorised syndicate. The tests made show that the soil throughout *Gezira* is uniform, that it possesses sufficient alkali and phosphoric acid, but, as all Egyptian and Sudanese soils, it is poor in nitrogen and organic substances.

The pioneer work at Tayiba was begun in July, 1911, under the management of Mr. MacGillivray, and from the first exceptionally favourable results were obtained, although, with the exception of a few tenants who had been brought from Zeidab, not one of the natives had ever before grown cotton under artificial irrigation. With the help of a pumping station on the Blue Nile, a 7ft. wide main canal and two tributary canals, each about 2 km. long, and a close net of ditches, which take the water all over the land, 520 acres were first put under cultivation, and of these 271 were planted with Nubari and Afifi, which, on an average, gave about 4 kantars of lint of an excellent quality. Some planters succeeded in growing as much as 5 kantars.

These experiments are now being continued on a larger scale, and as the district is relatively well-populated, it seems that at least for the beginning there will be no lack of labour. It still remains to be stated that the Government had undertaken experiments in growing Mit Afifi at Wad Medani as far back as 1903.

The relatively dry district situated between Berber and Sennar has, moreover, the advantage to be free from cotton insects and pests which cause such great damage in all other cotton districts. There are locusts and white ants, but the weeds seem to be absolutely a negligible quantity.

In 1912 the details of the irrigation scheme for the Gezira have been worked out, and it has been provisionally decided to build a dam on the White Nile between Omdurman and Khartoum, or a little higher up the river, at an expenditure of £500,000 to £750,000, in order to store water to replace that taken from the Blue Nile for the irrigation of the Gezira. This dam would materially increase the summer supply available for Egypt, could control the Nile water during the months of September, October, and November, in favour of the basin irrigation of Upper Egypt, and, besides, could bring under cultivation by flood water broad stretches on the river banks on the Kordofan side of the White Nile. A suitable site for the Sennar dam on the Blue Nile is also already fixed.

In addition to the Blue Nile itself, the districts between its tributaries, the Dinder and Rahad, rising in Abyssinia, seem suitable tracts of great fertility, and, with the aid of the flood of the Rahad, 200,000 feddans might be brought under cotton cultivation by irrigation at an expenditure of £E2 per feddan. The types of cotton planted here as rain crops have in the past certainly been of inferior quality, and are mainly for domestic use. But Mit Afifi, planted on the trial farm at Kamlin in 1904, yielded very good results.

In Kassala, near the Abyssinian frontier, important trial plantings of cotton, aided by basin irrigation of the river Gash, a tributary of the Atbara, have been undertaken by the Government, and a superior white quality of cotton, almost better than Abbassi, has resulted. By means of irrigation plants, which would cost about £E2 per feddan, 200,000 feddans could be brought under cotton cultivation. In order to make the cultivation of cotton into an export industry modern means of transport must first be established in order to carry, at favourable freight rates, the surplus of cotton after satisfying the domestic requirements. Formerly the transport of these small quantities was made on the backs of camels to Suakin. In 1909,

trials were also made in the Kassala district with American seed, which gave good results in the neighbouring district of Erythria.

A long-existing cultivation of cotton, which supplies the main portion of the "Suakin cotton," and in the past supplied almost the whole of the Sudan cotton production is carried on near the Red Sea at Tokar; it is a kind of Delta plain, embracing about 400,000 feddans, which has been formed by the Khor Baraka, and is annually overflowed in stretches and manured by this river which comes down from the Abyssinian Highlands. The land so fertilised, belonging entirely to the Government, is divided by the Government into small lots, and rented to the nomadic tribes of the surrounding districts, who settle here for a few months for this purpose. Sowing takes place between August and October, according to the great fluctuations of the flood time, and the harvest follows between the middle of January and the middle of June, chiefly in February. The yield per feddan is about 200lbs. of lint. These Delta soils, which are very fertile and moist through the annual floods, can be sown with cotton every year without rotations of crop; only on the boundaries of the flooded land, and assisted by the local rains, are also durra, duchn, millet, and vegetables grown along with cotton, but, generally, it is preferred to plant cotton, which pays better, and with the cash received for cotton the natives buy the food crops. The village of Tokar is the only fixed settlement of this thinly populated district of nomadic tribes, and in the cotton season possesses about 10,000 inhabitants, receding to 2,000 after the picking of the cotton. The seed cotton is sold in Tokar by public auction, having been previously classified by Government officials—the qualities are numbered 1 to 4, and another class is made up by an inferior grade. The cotton sold is packed in bales in the market itself, weighed, sealed, and marked with the grade number, and then taken on the backs of camels to the Port of Trincitat, which is situated about 30 km. distant, it is then forwarded in open sailing boats to Suakin, a further distance of 35 km., where, up to now, the only large ginning station of the Sudan is to be found. The freight on cotton from Tokar to Trincitat amounts to 20 P.T. per 800 Rottls for the forwarding per camels, and the freight for the sailing boats from Trincitat to Suakin is 5 P.T. per bale of 400lbs.

One-fifth of the cotton crop and two-thirds of the seed went in 1911 from Suakin direct to Liverpool. Suakin cotton reaches the Egyptian market only about April.

The floods in the Tokar district vary very considerably, and the rainfall is insufficient of itself for the cultivation of cotton. Whereas in the year 1893 only 150 feddans of flood land were cultivated, in the year 1900 as many as 30,000 feddans were under cotton, and the tendency is still upwards; the development of the cotton crop in Tokar is shown by the following figures:—

	Flooded Feddan.	Harvest Kantar.	Average Price per Kantar.	Total Value of Crop.
			£ E.	£ E.
1904—05....	39,600	47,400	0·320	15,179
1905—06....	33,400	42,100	0·725	30,984
1906—07....	36,300	65,900	0·652	56,070
1907—08....	50,600	90,000	0·537	48,347
1908—09....	28,200	53,000	0·652	34,550
1909—10....	45,300	98,600	1·487	146,565
1910—11....	53,500	155,000	0·942	146,180
1911—12....	43,900	112,000	0·868	97,230

The areas sown with cotton were given in 1904 as 7,400, in 1908 as 18,000, in 1911 as 29,000 feddans.

The so-called "Suakin" cotton was, until recently, certainly considerably inferior to Egyptian in quality; it was rather coarse and short, and therefore obtained a price per kantar which was £E1 less than that paid for Egyptian. In the year 1909, however, the Government, to which all the land under cotton in the Tokar district belongs, took the matter up energetically, caused the eradication of the old cotton roots before the fresh sowing, distributed good Egyptian Mit Afifi seed of a uniform quality, suppressed the use of inferior and mixed seed, and insisted upon careful picking and packing, so that the cotton is now brought into market pure, without sand and dirt, and it secured the same, or sometimes a slightly higher price than Egyptian, although at times there is still mixing with inferior kinds of cotton carried on in the ginning factories. In order to instruct the natives, who cultivate the cotton without European assistance, in rational agricultural methods, the Government has appointed a permanent cotton inspector in Tokar, with a sufficient staff, and has established in various parts of the district three model farms each of 75 feddans.

It is hoped to increase the present area under cultivation to 60,000 feddans by the making of irrigation works, and the controlling of the flood, which, no doubt, will demand careful investigation; the work will cost about £E80,000, and would make the construction of a railway about 70 km. long, from Tokar to Suakin, desirable. Private capital has already been offered for a line from Tokar to Trincitat, but the Government refused this offer, principally on the ground that it wished to retain the railway system in the Sudan under its own control.

In the south-eastern Sudan, where nothing but rain cultivation is possible, wide stretches, which have been opened up by the railway, are, similar to Uganda, very suitable for the growing of American Upland cotton, but, of course, the uncertainty of the rainfall has to be reckoned with.

The land planted with cotton in the whole of the Sudan, according to official figures, was:—

	Artificially irrigated.	Rain cultivation.	Flood cultivation.	Total.
		Feddans.	Feddans.	
1904.....	4,251	3,465	7,551	15,267
1905.....	5,236	2,305	16,357	23,898
1906.....	6,448	5,606	9,734	21,788
1907.....	7,728	4,028	20,191	31,947
1908.....	6,136	3,254	19,611	29,001
1909.....	6,386	7,334	13,414	27,134
1910.....	9,057	8,774	27,224	45,055
1911.....	9,110	10,093	40,276	59,479

Stimulated by the signal success of their efforts in the promotion of the cultivation of cotton in the Tokar district the Government has worked out, in 1912, a programme which places the whole of the cotton growing and cropping, everywhere in the Sudan, under Government control.

The "Sudan Cotton Ordinance of 11th November, 1912," published in the meantime, states amongst its chief points the following : It rests with the Government to regulate the importation, distribution, and use of cotton seed, and to prohibit the planting of undesirable varieties. After completion of the picking all cotton sticks are to be pulled up; they must never remain standing for subsequent crops. All ginning factories must have Government licences ; and work under the control of the State ; only healthy children, over 9 years of age, may be employed therein. The various varieties of cotton are to be strictly separated in the ginning factories and ginned separately. The seed resulting from Sudan cotton shall not be used for sowing purposes in the Sudan, but be exported. Only clean picked cotton is allowed to enter the purchasing markets, and the government has power to order its compulsory official classification and marking before giving permission for exportation.

The British Cotton Growing Association has also recently taken an increasing interest in the support of cotton growing in the Anglo-Egyptian Sudan. The British Cotton Growing Association took shares to the extent of £9,000 in The Sudan Plantations Syndicate, Ltd., after Sir William Mather had delivered his address in Manchester, and in the winter of 1911/12 it sent a special commission, under the leadership of the chairman, Mr. J. Arthur Hutton, to the Sudan. The reports of this commission spoke very favourably of the extremely good qualities grown in the Sudan, and are very hopeful as to the future possibilities. The following is a résumé of the various cotton growing districts of the Sudan, as given in the report of the British Cotton Growing Association :—

(1) *Tokar.* Good prospects for the annual cultivation of 10,000 to 20,000 bales of good quality in the immediate future.

(2) *Khartoum and the north.* Fair prospects for growing 5,000 bales, or more, of high-class Egyptian cotton in the near future,

with the prospect of a further increase, if an earlier ripening and more resisting type of cotton can be introduced.

(3) *Gezira Plain.* One of the most hopeful cotton growing districts of the world. Certainly possible, even in the near future, to obtain an annual crop of 10,000 bales and more of a really high-class Egyptian cotton, with prospect of increasing to 250,000 bales within the next 10 or 15 years, and to 1,000,000 bales and more in a farther distant future.

(4) *Rain district.* The prospect of growing American cotton there are extremely encouraging. There is sufficient land for the growing of millions of bales and development will depend upon increase of the population, active procedure of the Government, and the necessary commercial support in the erection of markets and ginning stations.

(5) *Gedaref and Kassala* afford good prospects for cotton cultivation, with artificial irrigation, as also with the rainfall.

On the basis of these findings of the Commission, the British Cotton Growing Association, at their annual meeting of 21st May, 1912, requested the British Government :—

(1) To grant to the Sudan Government a sum of £200,000, to be used for the purpose of investigations and experiments with a view to the extension of the cotton cultivation in that country.

(2) To provide the Sudan Government for the beginning with the sum of £1,000,000, for the construction of irrigation and other works, which are necessary for a quick expansion of cotton cultivation in the Sudan.

It is hoped that these amounts will suffice for the *beginning*, but it is estimated that a total expenditure of £8,000,000 for irrigation works and railways, and £4,000,000 as working capital, &c., will be required. The first sum is to be provided by the British Government, the latter to be found by private enterprise.

In the meantime, however, nothing further was heard about these projects; neither the English nor Egyptian Government seemed to be disposed to come forward with the necessary capital; the Sudan had not sufficient means of its own for large undertakings of this kind, and private capital was held back, as the transaction did not offer enough incentive. As a matter of fact, a large part of the land of the Gezira is in the possession of the natives. It was a singular occurrence that of the numerous English spinners who took part in the International Cotton Congress in Egypt in the autumn of 1912, not a single one made use of the favourable opportunity of visiting the Sudan and of forming an opinion of his own as to the possibilities of that country. Meanwhile, while the German edition of this book was being printed the Prime Minister of England, the Rt. Hon. H. H. Asquith, informed a deputation from the British Cotton Growing Association, on the 23rd January, 1913, that he intended at the beginning of the next session to bring forward a Bill by which the Government will be empowered to undertake the guarantee of the interest on a loan of £3,000,000 sterling, the loan to be raised by the Government of the Sudan for the development of cotton growing.

## THE PURCHASE, GINNING, AND PRESSING OF COTTON.

The purchase of Sudan cotton is mostly undertaken by Greek and Syrian dealers. These industrious merchants and money-lenders from Egypt have also advanced into the Sudan. At Tokar, buyers from some large Alexandrian firms, such as Lindemann and Carver, may be met with at the time of picking. For the Gezira the central collecting place is Wad Medani, where the cotton is ginned in order to be sold via Khartoum. Zeidab sends its own production to Liverpool. This bill has since, on the 23rd of April, 1913, been adopted by the House of Commons.

Money, weights, and measures are in the Sudan exactly the same as in Egypt. In order to rid the country gradually of the native measures, which vary from place to place, the metric system has been introduced.

Maria Therese dollars are not legal tender in the Sudan, but in the trade with Abyssinia they are an absolute necessity, and for this purpose the Government imports this coin. A Marie Therese dollar is worth a little less than 2s.

Ginning stations are in existence at Suakin, Khartoum (Gordon College), Wad Medani, Zeidab, and Kassala (Industrial School), and are not quite sufficient for the present requirements. In 1911 as much as  $82\frac{1}{2}$  per cent. exported cotton was ginned, whilst in 1910 this percentage was only 28.

The only real ginning factory of the Sudan belongs to a Syrian at Suakin. It has 50 Platts roller gins, and charges 12 P.T. per kantar for ginning expenses.

## EXPORT OF COTTON.

The total export of the Sudan has risen from £E264,000 in 1906 to £E1,377,000 in 1911, therefore in five years it has risen five times its value; cotton and cotton seed, which have advanced in this same period from £E50,000 to £E267,000, represent the second largest commodity of export, gum being first.

Cotton and cotton seed together show the following figures :—

Year.	Quantities in 1,000 kg	Value in £E	Ginned.	Unginned	Seed.
1901 .....	1,200	13,000			
1902 .....	150	1,400			
1903 .....	1,100	21,000			
1904 .....	1,800	41,000			
1905 .....	2,000	34,000			
1906 .....	2,300	50,000	= 20,675	26,570	3,175
1907 .....	4,400	103,000	= 44,000	52,000	7,180
1908 .....	5,400	89,000	= 41,450	39,210	8,610
1909* .....	3,900	65,000	= 39,280	16,970	9,030
1910 .....	8,700	235,000	= 73,170	151,530	10,475
1911 .....	12,400	267,000	= 195,270	40,575	31,580

\*Decrease on account of unfavourable flood of the Khor Baraka.

Separate figures for :	1910		1911	
	1,000 kg.	£E.	1,000 kg.	£E.
Ginned cotton .....	799	73,239	3,109	195,270
Unginned cotton .....	6,214	151,529	2,180	40,575
Cotton seed.....	1,710	10,476	7,105	31,580
Of these .....		235,244		267,425
Tokar District .....	4,431		6,972	
Khartum and Nile Valley North of Khartum .....	798		747	
Rest of the Sudan, mostly rain crops.....	3,494		4,675	

As the total export of the Sudan in 1910 was £977,620, in 1911 £1,376,950, cotton and cotton seed with 24 and 20 per cent. constitute a very formidable percentage.

About half of the Sudan exports are sent via Suez, and are loaded there in steamers for Egypt or for Europe. It is hoped that in consequence of the increasing shipping opportunities in Port Sudan, direct shipments to Europe will more and more increase. In 1910 we have already had direct cotton shipments which until then had been sent via Suez and Egypt for further exportation. In 1911, 743 tons of cotton and 4,839 tons of cotton seed were sent direct to England.

The export duty of cotton is in the Sudan exactly the same as in Egypt, viz., 1 per cent. *ad valorem*. Certain produce, as gum, ostrich feathers, ivory, &c., have to pay in addition a royalty of 10 to 20 per cent. *ad valorem*.

In 1908, a Sudan Chamber of Commerce was established in Khartoum; this is mostly composed of Greeks. Mention must also be made of the Omdurman Merchant Association, created in 1911 by a Hungarian, Mr. Albert Singer, which at the beginning had various differences with the Government, but seems now to be able to command respect and influence.

Besides the National Bank of Egypt, there is in Khartoum an agency of the Banque d'Athènes, although there is really no urgent need for the establishment of a second bank.

#### CALOTROPIS.

Almost everywhere in the Sudan we find scattered a weed on the poorest soil and frequently in the desert; it is "Calotropis procera," of the family of the Asclepradaceae. It grows into shrub also 6 feet high, its large oval leaves stand out vertically, it has numerous violet flowers and large boll fruit, and as a desert plant it is certainly of luxurious growth. This plant, which annually throws out new shoots from the root, is called in Arabic "Ushr," and from an economic point of view it was hardly known in the Sudan. Its coarse, dry branches are used as fuel or for making charcoal. The fibres of the green stems, which are more than 4ft. in length, are sometimes used for making ropes. The fact that the silky hairs of the seed have a considerable commercial value was as much unknown in the Sudan at the time of my visit in the autumn of 1912 as amongst the Alexandrian exporters. This desert-silk of the Ushr plant, which is similar to that of the Kapok, has gained extraordinarily in impor-

tance since the Chemnitzer Aktienspinnerei, assisted by the teaching staff of the Chemnitz Technical College, has been able to devise a patented process for spinning this material, that had hitherto been only employed for upholstering purposes. The principal supplier of this fibre has so far been East India, where it is known as "Akon."

I have had various interviews with the officials of the Sudan Government, who are very much interested in this new product for export, with a view to ascertaining the best methods for promoting the export of this Ushr fibre, and in the course of my interviews I have laid stress on the following three points:—

- (1) That the Sheiks of those districts in which "Ushr" grows abundantly, and which are already connected with modern means of transport, are to be instructed to direct the collection of this fibre.
- (2) That no royalty should be charged on the export of Ushr.
- (3) That the Government should make as low a charge as possible for carriage on the railways and freight on their steamers.

The Government has willingly accepted these three points, and intend to promote the growing and collecting of the fibre as much as possible; a German firm has been entrusted with the commercial part.

The result remains to be seen.

The difficulties in connection with the development of the Ushr fibre are:—

The milky juice of the plant is poisonous; it is, at times, used by the men who are called upon to serve in the army, in order to escape from military service; they inject the milky substance into one eye, with the result that they lose the sight of it. If the collecting of the fibre is done carefully there need be no fear as to any poisoning, but a prejudice will certainly have to be overcome. The collecting of the fibres must also be undertaken in proper time and carefully, as otherwise the wind would blow away a great many fibres; and, finally, the wages for the picking will be of great importance. If a person could only gather 1 kg. of fibre in a day and receive for this work 3 P.T. it would not be remunerative. It seems, however, possible that the picking could be carried out cheaper.

There are in the Sudan various other fibre plants which might, under certain circumstances, supply commodities for export, for instance, "Papyrus" and the "Leptadenia spartium," in Arabic "Merakh."

#### MEANS OF TRANSPORT.

In spite of the great improvements carried out since the English occupation, the means of communication still leave much to be desired.

The natural road of communication of the Nile towards the north is impossible, owing to the six cataracts which begin just below Khartoum and extend up to Assuan on the Nubian-Egyptian frontier, but the water-way of the Upper Nile is sufficiently good up to Gondokoro and Uganda, after it has been possible to cut through the swamps caused through the floating masses of plants, called the "sudd." These large swamps of the

Upper Nile have an area of about 100,000 square km. The Upper Nile is used the whole year through for a regular service of steamers belonging to the Government, and it was also navigated by the steamers of the Sudan Development and Exploration Company, which, however, have been bought up in 1911 by the Government. Steamers ply also during the six months, from July to December, on the Blue Nile. On account of the expensive price of coal, which has to be imported from abroad, the cost of which is about £E3 in Khartoum, £E4 in Taufikia, per ton, mostly wood is used as fuel on these steamers, which is causing a quick disappearance of the forests lining the banks of the Blue and White Niles. It was a recent invention of a south-German, a Dr. Höring, which enabled the above-mentioned "sudd," of which enormous quantities can be had, to be prepared into briquettes. An Anglo-German Syndicate, whose style is "The Sudan Industries Company," was floated at the beginning of 1911 for the purpose of building a small experimental factory at Khartoum for the preparation of "suddite," and as the price of this new fuel, which may still be improved, is only £E1 per ton, it is quite possible that considerable advantage will result from it; suddite cannot be used for ordinary heating plannings.

The railway in the Sudan has a larger natural field than in Egypt, but on account of the sparse population and of financial reasons, will only progress slowly after the country, which is separated from the rest of the world through a glaring and almost waterless desert, has been brought into closer touch with civilisation through the construction of modern means of transport. All Sudan railways have been constructed by the Government, and are managed with military promptitude.

From 1896 to 1898, during the advance march of the English, the military railway up to Abu Hamed, through the desert, was constructed under great difficulties, in 1899 it was taken to the capital, Khartoum (Wadi Halfa-Khartoum, 930 km.), and since then the railway lines have been considerably improved. A branch line of 251 km. in length was taken off, in 1907, at Abu Hamed, going round the fourth cataract to *Kareima* and establishing communication between the sea and the Dongola province. A second branch railway connects Wadi-Halfa with Kerma above the third cataract, but on account of its bad condition it has not been used for years. The construction of the railway from Khartoum towards the south, via Sennar and Goz Abu Goma on the White Nile, was not delayed, and this line, which is 689 km. long, was completed in January, 1912, up to the provincial terminus, El Obeid, which is the capital of the important province of Kordofan. The immediate influence of this southern railway on the increased cultivation of durra, oil seeds, and cotton has by far excelled all expectations.

On the other hand, there is no railway connection in existence between Shellal and Wadi-Halfa, a distance of 334 km. in the Nubian desert, which is on the direct route between Cairo and Khartoum, and this journey must still be undertaken by steamers on the Nile. The scheme which was formerly planned of constructing a railway through the Nubian district appears to have been entirely given up.

It seems now the intention of concentrating the whole exterior trade of the Sudan to *Port Sudan*, which is the shortest way to the Red Sea. During 1904 and 1905 a line was constructed 485 km. long from Atbara to Port Sudan, and opened in the spring of 1906. Atbara is on the main line 305 km. from Khartoum, and is the seat of administration of the Sudan Government Railways. The line which takes the train to the Red Sea leads through the Arabian rock desert, and ascends a height of 840 m. above sea level.

Originally it was intended that the railway should have its terminus at the old commercial town of Suakin, but as the harbour there, on account of its coral reefs, is not open to large steamers, it was decided in 1904 to build a new harbour, 60 km. north of Suakin, in a large and well-protected bay of the desert. This new harbour is Port Sudan. Here is, since 1906, the seat of the custom-house administration. In 1909, the excellent and quite up-to-date harbour works were opened, and there are at present 13 lines of steamers calling regularly at Port Sudan. Amongst these is the German Hamburg-America Line; steamers up to 10,000 tons can easily anchor. The freight for 1,000 kg. is as follows :—

	From Zeidab to Port Sudan = 517 km.	From Khartoum to Port Sudan = 808 km.
	£ E.	£ E.
On ginned and pressed cotton .....	1,910	2,928
On unginned and densely pressed cotton	2,107	3,332
On unginned and lightly pressed cotton ..	2,427	3,737

The charges for transferring the cargo in Port Sudan are 20 P.T. per metric ton; the rate of freight was at the end of 1912 250 P.T. per metric ton for ginned cotton from Port Sudan to Liverpool, and 125 P.T. for cotton seed from Port Sudan to Hull. The freight on ginned cotton from Port Sudan to Trieste was quoted as about 200 P.T. per 1,000 kg.

As the rates of freight via Port Sudan are about 8 per cent. cheaper than via Wadi-Halifa, it is quite natural that the former route is preferred. Since 1912 the Egyptian Government has prohibited entirely the importation of unginned Sudan seed cotton in order to obviate its mixing with Egyptian cotton.

During 1911, 312 ships, with a registered tonnage of 574,000, called at Port Sudan. The number of inhabitants of Port Sudan is to-day, after the workmen of the railway and harbour works have quitted the place, only about 1,000. There is no local industry, and cultivation in the district is, with the exception of a few vegetables and a little forage, almost non-existent.

Suakin is connected through a branch railway with the main line and has maintained the lion's share of its old trade with India. Cables connect Suakin with Suez and Dshidda; Port Sudan is also connected with the cable net of the world.

As long distances of the Sudan railways lead through deserts, it will always be necessary that the fares are high, in order to cover to some extent the expenses.

For the promotion of a remunerative cultivation of cotton the extension of the railway net would be an essential preliminary condition, and the carriage would have to be at low rates, covering, perhaps, only the prime cost. It should not be the aim to make a profit on the transport of cotton. The project for the immediate extension of the railway seems to have reached its present termination with the construction of the line to El Obeid. The next step will probably be a railway from Sennar viâ Gedaref, Kassala, and Tokar to Suakin. It is also intended to construct a railway later from El Obeid to Kordofan and Darfour.

In 1911, the freights on the railway and Government steamers were reduced. A through rate was introduced for the route between Port Sudan and Gambela, 2,232 km. long. Gambela is a trading station on the Baro, a contributory of the Sobat, which flows into the White Nile. It belongs to Abyssinia, and is only leased to the English as a trading station.

This transit-commerce with western Abyssinia viâ Gambela commenced in 1904, and since 1905 steamers of 600 tons ply regularly between Khartoum and Gambela from June to November. Transportation in the Sudan becomes very expensive owing to the high wages paid to carriers, which fact is easily explained through the lack of labour.

The old caravan routes are very much neglected in consequence of the extension of the railways, and the roads which serve for local traffic are very primitive indeed, although, latterly more attention is being paid to the construction of the ordinary roads. Mention might be made of the main road between Khartoum and Kassala, which is fit for motor traffic, and which keeps up communication with Erytrea, also of the new commercial road between Sennar and Gallabat on the frontier of North Abyssinia.

Camels and donkeys for transport are very numerous.

A large number of new wells have been constructed along all main roads.

#### FUTURE OF SUDAN COTTON.

The industrial development of the Sudan has had to be, so far, according to all circumstances, a slow one, and even to-day one can only with difficulty forecast to what extent agriculture will develop, and at what period it will reach an important turnover. Both these items depend, even if no unforeseen circumstances occur which might cause a set-back to the work of civilisation that is being introduced by an excellent staff of officials, upon a large number of conditions, on which the Government can only have a limited influence. The Government administration is acting very prudently by proceeding step by step and not advancing reforms too rashly. Lord Cromer, in speaking in one of his last Sudan reports, which, in a way, may be looked upon as the last will and testament of this author shortly before leaving Egypt, said quite rightly, "that the work of generations cannot be crowded into a few years." In the first instance,

the problem of population is the most pressing one for a country which, until quite recently, has been one of the least populated on the globe. The native population increases, judging by the percentage of children, in a most baffling manner, but as regards immigration from abroad only slow progress is being made, and slower still is the immigration from Europe.

A quicker ratio in the development of the Sudan might be made feasible through the introduction of a large amount of foreign capital, but the Egyptian boom, with its evil consequences, has also thrown a shadow on the Sudan, and thus the unhealthy speculation in Egypt has deterred also the investment of money in the Sudan on the part of careful capitalists. Of the various more important Exploration Companies which were established in London from 1900 onward for the development of the Sudan, the last and most important, the "Sudan Development and Exploration Company," which was floated in 1900 with a capital of £150,000, has been liquidated in 1911 after suffering heavy financial losses; nothing is known of the activity of the "Sudan Land and Commercial Company," founded in 1907 with £125,000, whose shares are not quoted in the lists.

Although the Central Economic Board of the Sudan Government has latterly encouraged sound undertakings, pure speculation has always been rightly excluded. Up to lately, the Government was more in favour of the promotion and extension of the rain cultivation of the natives south of Khartoum in place of the cultivation through artificial irrigation, for which large financial responsibilities will have to be incurred.

The most promising prospects seem to lie in the exports from the Sudan of corn and cattle to Egypt, which have already increased, although even there, the rise will only be a slow one. As to how quickly the development of cotton cultivation, with the help of artificial irrigation, will be achieved, cannot yet be said, but the conclusion seems to be justified that the Sudan will hardly be, in the near future, a country that will produce such quantities of cotton as will have an influence on the markets of the world.

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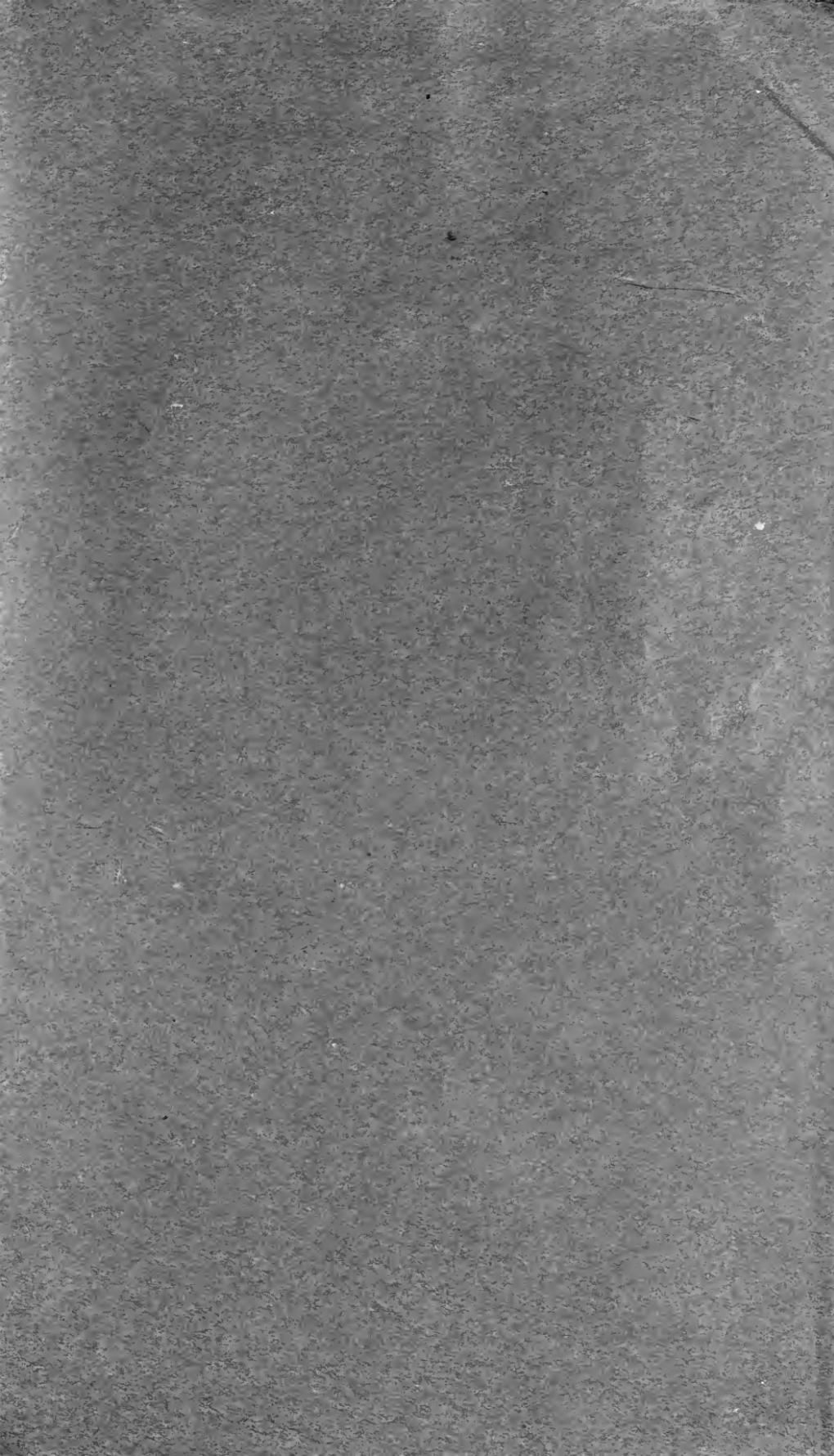
## Books of Reference.

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- Theodor Neumann, Das moderne Aegypten. 1893.  
A. von Fircks, Aegypten 1894. 1895/96.  
George P. Foaden, Cotton Culture in Egypt. 1897.  
A. Oppel, Die Baumwolle. 1902.  
Heinrich Semler, Die tropische Agricultur. Band III. 1903.  
Moritz Schanz, Aegypten und der ägyptische Sudan. 1904.  
Henri Lecomte, Le coton en Egypte. 1905.  
F. Linder, Das Nilland. 1906.  
François Charles Roux, La production du coton en Egypte. 1908.  
Text Book of Egyptian Agriculture. Ministry of Education, Cairo. 1908/10.  
Dr. A. Zimmermann, Anleitung für die Baumwollkultur in deutschen Kolonien. 1910.  
Siegfried Strakosch, Erwachende Agrarländer. 1910.  
William Mather, Egypt and the Egyptian Sudan. 1910.  
Rapport général de la Commission du coton. 1910.  
Denkschrift des Reichskolonialamts, Die Baumwollfrage. 1911.  
Arno Schmidt, Cotton Growing in Egypt. 1912.  
W. Lawrence Balls, The Cotton Plant in Egypt. 1912.  
Bally Frères, Le coton égyptien et la Bourse des Marchandises à Alexandrie. 1912.  
Carl Pyritz, Die volkswirtschaftliche Entwicklungstendenz in Aegypten und im Sudan. 1912.  
Mitteilungen der Deutschen Landwirtschafts-Gesellschaft, Berichte von Dr. Axel Preyer. 1902—05.  
Reports of the German Imperial Consulates at Alexandria and Cairo.  
Reports of the Alexandria General Produce Association.  
Berichte von R. und O. Lindemann, Alexandrien.  
Journal and Yearbooks of the Khedivial Agricultural Society.  
Bulletin de l'Union Syndicale des Agriculteurs d'Egypte.  
Journal of the Cairo Scientific Society.  
Der Tropenpflanzer.  
Annuaire de la Finance Egyptienne. 1907.  
Annuaire statistique d'Egypte. 1912.  
Official Reports on the Finance, Administration and Conditions of Egypt and the Sudan. Up to 1911.  
Reports on the Finance, Administration and Condition of the Sudan. Up to 1911.  
Central Economic Board Sudan Government. Annual Reports. Up to 1911.  
Investment List by Reid Barnard & Co., Alexandria and Cairo. 1912.

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